Technology Transfer: Open Licensing and Developing Countries

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Abbreviations

Acquired Immunodeficiency Syndrome (AIDS)
Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS)
Andean Common Market (ANCOM)
Andean Trade Promotion and Drug Eradication Act (ATPDEA)
Berkeley Software Distribution (BSD)
British Broadcasting Corporation's Creative Archive (BBCCA)
British Pounds (GBP)
Bureaux Internationaux réunis pour la protection de la propriété intellectuelle (BIRPI)
Business Software Alliance (BSA)
Caja Costarricense del Seguro Social (CCSS)
Central American Free Trade Agreement (CAFTA)
Commission on Intellectual Property Rights (CIPR)
Convention on Biological Diversity (CBD)
Copyrights, Designs and Patents Act (CDPA)
Creative Commons (CC)
Digital Rights Management (DRM)
European Cultural Heritage Online (ECHO)
European Economic Community (EEC)
European Patent Convention (EPC)
European Patent Office (EPO)
European Union (EU)
Euros (EUR)
Expressed Sequence Tags (ESTs)
Foreign Direct Investment (FDI)
Free and Open Source Software (FOSS)
Free, Libre and Open Source Software (FLOSS)
Free Software (FS)
Free Software Foundation (FSF)
Free Trade Area of the Americas (FTAA)
General Agreement on Tariffs and Trade (GATT)
General Public License (GPL)
Genetic Modification (GM)
GNU Free Documentation License (GFDL)

GNU is not UNIX (GNU)
Gross Domestic Product (GDP)
Gross National Product (GNP)
Human Development Index (HDI)
Human Development Report (HDR)
Human Genome Organisation (HUGO)
Human Immunodeficiency Virus (HIV)
Information and Communication Technologies (ICTs)
International Centre for Trade and Sustainable Development (ICTSD)
International Chamber of Commerce (ICC)
International Code of Conduct for Technology Transfer (TOT Code)
In-vitro fertilization (IVF)
Least Developed Countries (LDCs)
Médecins Sans Frontières (MSF)
Multinational Enterprises (MNEs)
National Institute of Health (NIH)
Non-governmental Organizations (NGOs)
Nuffield Council on Bioethics (NCB)
Open Access (OA)
Open Source Initiative (OSI)
Open Source Software (OSS)
Organisation for Economic Co-operation and Development (OECD)
Oxford University Press (OUP)
People for the Ethical Treatment of Animals (PETA)
Personal Computer (PC)
Pharmaceutical Research and Manufacturers Association (PhRMA)
Resource Description Framework (RDF)
Single Nucleotide Polymorphisms (SNPs)
Southern African Customs Union (SACU)
Technology Achievement Index (TAI)
Tropical Disease Initiative (TDI)
UN Food and Agriculture Administration (FAO)
Union for the Protection of New Varieties of Plants (UPOV)
United Nations (UN)
United Nations Children's Fund (UNICEF)

United Nations Committee on Trade and Development (UNCTAD)
United Nations Conference for Trade and Development (UNCTAD)
United Nations Development Programme (UNDP)
United Nations Educational, Scientific and Cultural Organization (UNESCO)
United Nations Industrial Development Organisation (UNIDO)
United States (US)
United Kingdom (UK)
United States Patent and Trademark Office (USPTO)
Universal Copyright Convention (UCC)
US Dollars (USD)
World Health Organisation (WHO)
World Intellectual Property Organisation (WIPO)
World Summit for the Information Society (WSIS)
World Trade Organisation (WTO)

Legislation and treaties

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Commission Regulation 240/96/EC on the application of Article 85(3) of the EC Treaty to certain categories of technology transfer agreements, OJ 1996. L 31/2.

Commission Regulation 240/96/EC on the application of Article 85(3) of the EC Treaty to certain categories of technology transfer agreements, OJ 1996. L 31/2.

Convention on Biological Diversity 1993.

Copyrights, Designs and Patents Act 1988 (UK).

Council Directive of 5 April 1993 93/13/EEC on unfair terms in consumer contracts, O.J. No. L95/29, 21.4.1993.

Council Regulation (EC) No. 953/2003 of 26 May 2003 to avoid trade diversion into the European Union of certain key medicines, OJ L 135/5, 3 June 2003.

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Medicines and Related Substances Control Amendment Act 1997 (South Africa).

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Patents Act 1977 (UK)

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Unfair Terms in Consumer Contracts Regulations 1999 (UK).

United States/Chile Free Trade Agreement.

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European Patent Office G3/95 OJEPO 1996/169.

European Patent Office T320/87 OJEPO 3/90.

European Patent Office T356/93 OJEPO 8/95.

European Patent Office T49/83 OJEPO 3/84.

Hoffman-La Roche + BASF + Rhône-Poulenc / PO. COMP/37.512.

Hoffman-La Roche v. Centrafarm (Case 102/77) [1978] ECR 1139; 3 CMLR 3217.

Hotmail Corporation v. Van Money Pie Inc., et al., C98-20064 (N.D. Ca., April 20, 1998).

Ibcos ComputersLtd v Barclays Mercantile Highland Finance [1994] FSR 275.

Interlego v Tyco Industries [1989] AC 217; [1988] 3 All ER 949.

J.E.M. AG Supply, Inc. v. Pioneer Hi-Bred International, Inc. 534 U.S. 124 (2001).

John Richardson Computers Ltd v Flanders and Chemtec Ltd [1993] FSR 497.

Mazer v Stein, 347 US 201 (1954).

Pharmaceutical Manufacturers Association of SA and another In re: the ex parte application of the President of the Republic of South Africa and others. Constitutional Court - CCT31/99, 2000 (2) SA 674 (CC); 2000 (3) BCLR 241 (CC).

Pharmaceutical Manufacturers Association of SA and Another: In re Ex parte President of the Republic of South Africa and Others. 1999 (4) SA 788 (T).

ProCD v. Zeidenberg, 86 F.3d 1447 (7th Cir. 1996).

R&B Customs Brokers Ltd v United Dominions Trust Ltd [1988] 1 WLR 321

Saladin/HBU, Hoge Raad, NJ 1967.261 (G.J. Scholten).

SAM Business Systems Limited v Hedley & Co. [2002] EWHC 2733.

Specht v. Netscape Communications Corp., 2001 WL 755396, 150 F. Supp. 2d 585 (S.D.N.Y., July 5, 2001), aff'd. -- F.3d -- (2d Cir., Oct. 1, 2002).

St Albans City & District Council v International Computers Ltd [1996] 4 All ER 481.

Step-Saver Data Sys., Inc. v. Wyse Tech., 939 F.2d 91 (3d Cir. 1991).

The Duriron Company Inc v Hugh Jennings & Co Ltd [1984] FSR 1;

University of London Press Ltd. v. University Tutorial Press Ltd. [1916] 2 Ch. 601.

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Introduction

> *In a time of drastic change it is the learners who inherit the future. The learned usually find themselves equipped to live in a world that no longer exists.*
> ***Eric Hoffer***

The problem of development has been at the forefront of international policymaking in recent years. The question of how can developing countries leave their impoverished state and become developed is one of the most important issues in the international agenda. The solutions to this problem are as varied as the number of commentators and international organisations that have attempted to deal with it.

One of the most important questions with regards to development is that of technology. The technological deficiency in a society can affect almost every aspect of a country's well being: from education to health; from economic competitiveness in a global economy to local governance; from media access to communications technology. It could be theorised that a society with technological advantages will have easier and cheaper ways to attempt to address many of the causes of poverty and underdevelopment.

But technology does not come free. In developed nations, technology is owned by means of intellectual property – knowledge comes at a price. This situation creates an obvious vicious circle for developing societies: they need technology to compete and become developed, but they lack the economic resources to buy and/or research that technology, therefore remaining poor. It could be argued that a restrictive regime of international intellectual property protection may stifle the trade of technology between developed and developing countries.

The present work will examine the technology trade, the cycle of poverty and address some of the issues that are at the heart of the technological gap. To do this, the study will analyse exactly what we understand as technology, and whether or not it is really necessary for development. The definition of technology thus developed will form the basis of the subsequent examination of the existing mechanisms of the ownership of technology, a process that will take the shape of the deconstruction of the justifications for the existence of intellectual property protection. This process will be illustrated by three cases from the developing world involving problems in the acquisition of technology in the area of information and communication technologies (ICTs). Towards developing solutions to this problem of access, the work will look for different models that may ease the transfer of proprietary technology to developing countries, in particular by the use of the open source model.

Recent years have witnessed an increase in the quantity and quality of studies dedicated to the subject of the economics of research and development for science and technology, with particular interest paid to the economic study of the impact of intellectual property rights in the fostering of innovation. Intellectual property has generally been considered as one of the most important drivers of new innovation in science and technology because it allows researchers, institutions and inventors to recover their investment in the shape of limited monopolies to their ideas. However, some authors have raised concerns that enhanced intellectual property protection may actually have adverse effects in the development of future research. Basic research had usually not been considered to be subject to protection, and up until recently it was generally offered to the public in the shape of peer-reviewed journals. However, there is a growing trend towards excessive commercialisation and protection of scientific data, usually considered outside the realm of protection, as illustrated in the case of the growing protection of the human genome.

Because access to scientific data has become a requisite of modern research and development (R&D), there is growing concern that the trend towards commercialisation will translate into less available public academic research, which would therefore reduce the overall scientific output. These worries have prompted several studies and reports that attempt to address the problem of the dissemination of academic scientific research. The area of biotechnology has been deemed to be of particular concern because of its significant economic potential; therefore it has been subjected in recent years to a patenting rush of unprecedented proportions. This phenomenon has prompted the release of genetic information into the public domain, which has also prompted fears of the misuse of the publicly available data by unscrupulous users, who will use this information to close and commodify research through excessively general patents.

These problems have motivated some to call for the devising and utilisation of new ways of protecting basic scientific research from potentially damaging commodification of knowledge. One proposed solution is to use the novel intellectual property licensing model that has been successful in software development, generally known as open source software. This system uses intellectual property protection to ensure the wider dissemination of software, by maintaining the copyright protection over a work, and then distributing it using a licence that allows further copying and redistribution of the work, ensuring that the wider community will have access to the software's source code and allow its modification and dissemination. There are several open source and free software licensing models, but the common denominator in most of them is to allow access to the source code and to allow users to disseminate the code without restrictions.

In particular, it is regarding access to scientific research and innovation that the possibility of translating some of these open source models to the scientific research arena comes into play. The initial application of the open source model has been in the adoption of a scientific publishing model often referred to as open access (OA). The OA movement can be best exemplified by the publication of scientific outputs and other materials online. These results are offered online without subscription charges, allowing the wider scientific community access to high-quality content with the click of a button. However, open access is not enough to ensure access to scientific works because OA generally covers only those materials that are subject to copyright protection, such as journal articles. If scientists want to distribute their works using the open source model, then there would need to be some sort of licence that allows the distribution of patented works, or works contained in scientific databases.

The solution would appear to be a simple matter of translating existing licences to protect patented research, but this has proven to be much harder than previously expected. It is very interesting that while there are new open access and open source licences created every day, an open science licence that protects research through patents and database rights has been slow in the making, despite the obvious enthusiasm from commentators, and extensive political will to generate such a licence.

There are many reasons for the difficulties encountered. Some have pointed out that the open source model does not work best with patented works, because the model appears to be in conflict with the public interest justifications for patents, which imply that inventors are expected to recoup the investment they have incurred. It has also been remarked that the open source model works best with copyright works because they protect creations that are immediately awarded protection, while patented research requires a specific application to the research, making its dissemination through open licences a more difficult endeavour.

Chapter 1. Technology and development

> *"It has become appallingly obvious that our technology has exceeded our humanity."*
> ***Albert Einstein***

Technological advance is omnipresent in modern Western society. In the last forty thousand years in which *homo sapiens* has ruled the planet – a geological and evolutionary blink of an eye – our species has tamed fire, developed agriculture, learnt how to work metal, discovered gunpowder, developed antibiotics, travelled to the Moon and split the atom. Even when modern humanity wants to get away from civilization and get closer to nature, technology is still there in the shape of waterproof fabrics, aluminium cooking utensils, flashlights and Swiss Army knives.

But this development is not shared around the world; access to the most basic technological advances has not reached large sectors of the human family. In many countries people die of malnutrition, have no access to mass communication, electricity, clean water or medicines; the very basic technological advances with which the inhabitants of the developed world have become so accustomed as to take for granted.

The central problem in this work is to try to describe and analyse ways in which less developed countries can access technology. However, the further exploration of this problem is not possible without first analysing whether the acquisition of technology is actually something to which the developing world should aspire. This is far from a settled issue, as will be shown in the following pages. There are many questions regarding the very assumptions about the technological model of development for which answers will be sought. Is technology required for development? Can societies become developed without the help of technology? Should we strive for technological advancement?

1. Definitions

1.1 Defining technology

Technology is a term that has many different definitions. Etymologically, the origin of the word comes from the Greek *tekhnologiá*, from the roots *techne* (art or craft) and *logos* (word), being read literally as the systematic treatment of an art or craft. The normal dictionary definition of the word is similar; for example, according to the Oxford English Dictionary, technology is

"the scientific study of the practical or industrial arts."[1] A more detailed definition is that used by the Encyclopaedia Britannica, which defines it as "*the application of scientific knowledge to the practical aims of human life or, as it is sometimes phrased, to the change and manipulation of the human environment.*"[2] As a general definition then, it can be said that technology is the systematic development of ways of undertaking a human action. There are many sub-definitions of technology. For example, information technology is usually defined as a term that encompasses all sorts of technology that are applied to the storage and transmission of information, including telecommunications and computer technology.[3] There are as many subdivisions of technology as there are fields of human endeavour.

Ray Kurzweil notes that technology is often defined as the creation of tools to change the environment, but points out that this theory is insufficient to explain adequately all of the different aspects of technology, as even some other primates can produce tools. He prefers to define technology as "*the application of knowledge -- recorded knowledge – to the fashioning of tools.*"[4] This definition includes art and language as technological creations.

Theodore Kaczynski, the infamous eco-terrorist and technophobe, makes a useful differentiation between two types of technology. In his words:

> *"We distinguish between two kinds of technology, which we will call small-scale technology and organization-dependent technology. Small-scale technology is technology that can be used by small-scale communities without outside assistance. Organization-dependent technology is technology that depends on large-scale social organization."*[5]

This definition is particularly useful because even the staunchest critics of technology – such as Kaczynski – tend to admit that small-scale technology is needed for the survival of modern society. Whenever technology is mentioned in this work, it will be assumed that it is organization-dependent technology and not small-scale, unless otherwise stated.

It is also important to differentiate science and technology, as they are often used interchangeably. According to some commentators, "*Science is the systematic enterprise of gathering knowledge about the world and organizing and condensing that knowledge into*

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[1] "technology", *Webster Dictionary*, 1999.

[2] "technology", *Encyclopædia Britannica*. http://www.britannica.com/eb/article?eu=73384&tocid=0&query=technology

[3] Center of Cyber Logistics. *Information Technology definition*. http://ccl.baf.cuhk.edu.hk/IT/definition.html

[4] Kurzweil, R. *The Age of Spiritual Machines: When Computers Exceed Human Intelligence*, New York: Putnam Books, 1990.

[5] Kaczynski, T. *The Unabomber Manifesto*, 1995. http://hotwired.lycos.com/special/unabom/list.html

testable laws and theories."[6] Nevertheless, both science and technology are very closely linked, as technology is usually considered a by-product of scientific advances. Science provides the theoretical structures; technology is the application of such structures. As commentator of science, Michael Shermer, notes:

> *"Scientific progress is the cumulative growth of a system of knowledge over time, in which useful features are retained and nonuseful features are abandoned, based on the rejection or confirmation of testable knowledge. By this definition, science (and technology by extension) are the only cultural traditions that are progressive, not in any moralistic or hierarchical way but in an actual and definable manner."*[7]

The word technology, as it is used today, is relatively recent. The term was originally used in ancient Greece to discuss the applied and fine arts, and it first appeared in English during the 17th century to describe the discourse of the applied arts. It was well into the 20th century that it started being used to describe the applied knowledge in a particular field of research.[8]

For the specific purpose of this work, the most adequate definition is the one used by the draft of the International Code of Conduct for Technology Transfer (TOT Code), drafted by the United Nations Conference for Trade and Development (UNCTAD), which states that technology is:

> *"…the systematic knowledge for the manufacture of a product, for the application of a process or for the rendering of a service and does not extend to the transactions involving the mere sale or lease of goods."* [9]

It is important to stress that according to this definition, goods themselves are not to be considered technology; rather, technology is the knowledge in producing and operating any given artefact. For example, a computer by itself is not technology; technology comprises the manufacturing skills, and the knowledge in operating it. A computer without such knowledge becomes an expensive and heavy collection of circuits.

1.2 Defining development

Trying to define development is not as straightforward as defining technology, mostly because there is a wide range of opinions about what development really means.

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[6] Park, R. *Voodoo Science*, Oxford: Oxford University Press, 2000, p.39.

[7] Shermer, M. *Why People Believe Weird Things: Pseudoscience, superstition and other confusions of our time*, New York: W. H. Freeman and Company, 1997, p.31.

[8] *"technology",* Encyclopædia Britannica, op cit.

[9] UNCTAD. *Draft International Code of Conduct on the Transfer of Technology*, June 20, 1985, Chapter 1.2. http://www.unctad.org/en/pub/pubframe.htm

The modern interest with development issues gained momentum after World War II and the process of dismantling the colonial powers. It has been a theory among certain academic circles that technological power was one of the reasons that allowed Western countries to establish colonial rule over less developed societies.[10] After the colonial powers were split into a large number of smaller countries, it was noticed that these countries were poor and under-developed, which was explained by years of economic exploitation. These observations resulted in the traditional definition of development, mainly measured by the economic well-being of a nation, expressed by the country's per capita income.[11] By using income as the measure for development, two types of development stages were identified, the developed and the under-developed world. Later, the term under-developed became obsolete and replaced with the much-favoured "developing countries".[12]

The developing countries are divided into two types: **low-income developing countries**, defined as those with per capita incomes below $400 US Dollars (USD); and **middle-income developing countries**, defined as those with per capita incomes between $400 USD and $4,000 USD. Anything higher would be considered a developed country.[13]

This traditional definition of development has some serious problems. For a start, there is the difficulty of obtaining accurate statistics from developing countries, and then there is the issue of translating often devalued currency into US dollars, which further hinders the analysis. An added problem is the existence of oil producing countries, which may have considerably high per-capita income, but that could be considered to be under-developed when looking at the rest of their economic infrastructure.[14] Raw per capita income data can also have the added problem of not really explaining the difference in the acquiring power of money in different locations around the world. Ten dollars will buy more in Cuba than in New York and Paris.

International organisations have realised that the traditional definition is not enough to try to determine if a country is developed or not. The World Bank for example, has made the following admission:

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[10] For a review of some of the literature in this area, see: Bicket, D. *Technological Determinism, Colonialism, and Postcolonialism*. http://www.geneseo.edu/~bicket/panop/techdet.htm

[11] Lal, D. and Myint, H. *The Political Economy of Poverty, Equity, and Growth: a Comparative Study*, Oxford: Clarendon Press, 1996, pp.348-354.

[12] Ibid.

[13] Ibid.

[14] Ibid.

> *"[I]ndicators of wealth, which reflect the quantity of resources available to a society, provide no information about the allocation of those resources – for instance, about more or less equitable distribution of income among social groups, about the shares of resources used to provide free health and education services, and about the effects of production and consumption on people's environment."*[15]

It is entirely possible that two countries with similar per capita income levels will have completely different distribution schemes, making one more developed than the other.

The modern definitions of development try to get around these problems by measuring more than per capita income when trying to determine whether or not a country is developed. Terms like sustainable development, or human development, are in vogue nowadays. The United Nations World Commission on Environment and Development has defined sustainable development as that which *"meets the needs of the present without compromising the ability of future generations to meet theirs."*[16] In the same philosophical approach to development, the United Nations Development Programme (UNDP) has begun measuring development using more tools than the mere economic analysis, with the launch in 1990 of the Human Development Report (HDR). The HDR considers many more elements, such as various health indicators, access to water, adult illiteracy rates, poverty rates, and many economic indicators.[17]

To the UNDP, human development is "*the process of enlarging people's choices*;"[18] it is seen as development with a human face, recognising that economic growth alone cannot immediately translate into human well-being. Strangely enough, even though human development is of very recent use as a measurement tool, its proponents claim that it has its origins in antiquity, where Aristotle said that "*wealth is evidently not the good we are seeking, for it is merely useful and for the sake of something else."*[19] Human development has then two elements: one is the improvement of the human capabilities by the access to health and education, and the other is the use of those capabilities made by any normal human being making its own choices.[20]

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[15] World Bank. *Beyond Economic Growth: Meeting the challenges of Global Development*, 2000, Chapter I. http://www.worldbank.org/depweb/beyond/global/chapter1.html

[16] UNCTAD. *The Report of the World Commission on Environment and Development*, UN General Assembly 96th General Plenary, resolution 42/186, 11 December 1987. http://www.un.org/documents/ga/res/42/ares42-186.htm

[17] UNDP. *About the Human Development Report*. http://www.undp.org/hdro/general/about.htm

[18] UNDP. *Human Development Report 1990: Concept and Measurement of Human Development*. 1990. http://www.undp.org/hdro/hdrs/1990/english/90.htm

[19] Cited by Anand, S. and Sen, A. *Sustainable Human Development: Concepts and Priorities*. 1994. http://www.undp.org/hdro/papers/ocpapers/Oc8a.htm

[20] Ibid.

Perhaps the best way to compare the two definitions is to contrast the traditional ways of measuring development with the modern terms. A straightforward look at the per capita income data from the World Bank for the year 2000 shows a list of countries at the top that should not be surprising, with Luxembourg, Liechtenstein, Switzerland, Bermuda, and the United States as the countries with higher per capita income.[21] It may not come as a surprise that some of these countries are considered tax safe havens. On the other hand, Canada is to be found at number twenty-six on the list, but on the Human Development Index (HDI) for the year 2000 Canada came in first, although in the 2003 HDI it had dropped to 8th place. Other interesting discrepancies can be found. On the income chart, Chile and Costa Rica are to be found further down the list, in positions seventy-two and seventy-seven respectively; but on the 2003 HDI both countries are thought to be amongst those with high human development, at positions forty-two and forty-three respectively. These two countries are even ahead of the Bahamas, which is positioned at forty-nine in the HDI, but always ranks very high on the income lists.[22]

For the purposes of the present work, there will be a merging of both modern concepts of development. Development, therefore, will be considered as the growth in people's choices by meeting the present needs of the society without jeopardizing the needs of the future generations.

1.3 Measuring development

Even more difficult than defining development is the categorisation of countries in order to establish which countries are developed and which are not. This is more difficult than it appears because many factors could be taken into consideration to measure development, as evident from the various definitions explored above. Whatever definition one prefers, there has to be an arbitrary line drawn to establish which country can be considered a developing country and which country will not.

The classic way to define underdevelopment is to use the term "developing country" to refer to those countries that are not properly developed in the material sense. Other terms that have been used interchangeably are Third World and the South. This work will favour the use of "developing country".

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[21] World Bank. *Gross National Income Per Capita Report 2000*. http://www.worldbank.org/data/databytopic/GNPPC.pdf

[22] UNDP. *Human Development Index 2003*. http://hdr.undp.org/reports/global/2003/indicator/pdf/hdr03_indicators.pdf

The easiest way to measure when a country is developing originates from the World Trade Organisation (WTO), which uses an entirely subjective self-assessment of development. The WTO requests countries to determine and announce whether they are developed or not, and then respects that self-definition, but other countries can challenge it.[23]

Tempting as it may be to follow the WTO's pragmatic approach, this way of classifying developing countries is not particularly useful, as it is evident that there are several different levels of development even within the generally loose definition of developing countries – China, Brazil and India are more developed than Haiti, Mozambique, and Rwanda. The need to differentiate between developing countries was first noticed at the first session of UNCTAD in 1964, where a working definition to differentiate developing countries was achieved, and the term Least Developed Countries (LDC) was born.[24]

The original definition of LDC included all countries with a GDP of $100 USD or less; share of manufacturing in total GDP of 10% or less; and adult literacy rate of 20% or less. The present definition has been tweaked to provide more accuracy and includes 49 countries, and it is still managed by UNCTAD. According to them, an LDC is included in the list if it fulfils the following criteria:

> *"...low national income (per capita GDP under $900 for countries now joining the list), weak human assets (a composite index based on health, nutrition and education indicators) and high economic vulnerability (a composite index based on indicators of instability of agricultural production and exports, inadequate diversification and economic smallness). Different thresholds are used for addition to, and graduation from, the list of LDCs. A country qualifies for addition to the list if it meets inclusion thresholds on all three criteria, and if its population does not exceed 75 million."*[25]

Although this is an extremely useful definition, particularly in order to differentiate one developing country from another, there are many instances where it may become useful to have much finer distinctions. Once again, the UNDP's Human Development Index provides an excellent way to differentiate between developing countries. The HDI offers three different types of stages for countries: high human development, medium human development, and low human development. This list tends to produce some surprises, as countries that are generally

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[23] WTO. *Who are the developing countries in the WTO?* http://www.wto.org/english/tratop_e/devel_e/d1who_e.htm

[24] United Nations. *The Least Developed Countries: Historical Background*, 2000. http://www.un.org/events/ldc3/prepcom/history.htm

[25] UNCTAD. *Least Developed Countries at a Glance*. http://www.unctad.org/Templates/webflyer.asp?docid=2929&intItemID=1634&lang=1

considered developed are included as high-development countries in the HDI, such as Cuba, Uruguay, and the Seychelles.

Another useful tool when categorising development is to measure developing countries against their opposite. The Organisation for Economic Co-Operation and Development (OECD) – which is made up of 30 countries united by their commitment to democratic rule and market economy – maintains comprehensive statistical records on developed countries. Membership in the OECD usually indicates development, with very few exceptions (such as Turkey).

This work will generally prefer to use the term "developing country" to refer to those countries that are underdeveloped, and it will generally use the WTO approach for the same pragmatic reasons. The work will differentiate LDCs and developing countries when necessary. The reason for this is because, although developing countries have very different circumstances and find themselves at various stages of development, part of the solutions that will be offered later in the work are done so regardless of whether a country is an LDC or in a medium development stage. It is also the author's view that many of the most pressing issues facing developing countries in the area of technology are shared by all developing countries regardless of their stage of development.

2. Relationship between technology and development

2.1 Establishing a link

The concepts enumerated just provide a description of the subject matter, but they do not say anything about the role of technology in development. It would appear evident through common sense that technology is indeed one of the main features of most developed countries; as there appears to be a strong correlation between technological advance and social and economic development.[26] However, common sense could be wrong, so it is important to attempt to draw a link, categorically speaking, between both.

Whichever definition of technology is used, the importance of technology to human society is becoming more evident as time passes. Humanity is increasingly dependent upon technology, and this phenomenon has prompted many historians and sociologists to propose that technology is one of the most important factors in shaping human history. However, the importance of technology to society is not the real issue, as it is almost self-evident that it is particularly

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[26] For more about this link, see: Inkster, I. *Science and Technology in History: An Approach to Industrial Development*, New Jersey: Rutgers University Press, 1991.

important; the real question is the role of technology for society. When history is analysed in detail, one must ask who is shaping whom. Is society shaping technology, or is technology shaping society? Or to re-word this conundrum: are particular societies developed because they are technologically advanced, or are they technologically advanced because they are developed?

At the heart of this question lies the concept of technological determinism, which in its most basic form can be explained as "*...technology as a driving force of history: a technical innovation suddenly appears and causes important things to happen."*[27] Technological determinism then is based upon the idea that technology shapes society and that it is independent in many respects of the society that gave birth to it. This is an interesting idea, which will become more important as the relationship between development and technology is explored further; but the main premise behind it appears to be rather simplistic and fails to explain why some societies are more suited to technological development and some are not. In the words of Robert Heilbroner, "*A theory of technological determinism must contend with the fact that the very activity of invention and innovation is an attribute of some societies and not of others*."[28]

Technological determinism in itself appears to have some serious problems when it comes to explaining the creation of technology and its eventual acceptance and dissemination in a culture, but the concept remains of considerable importance to the issue of technology and development. If technology were the main factor in the social mechanics that drive history, then it would be logical to assume that those societies with more technological advances will be the ones that are developed, and that those lacking technology will not, a phenomenon that would be caused by the shaping role of existing technologies upon a society. Thomas Hughes further explores this question, arguing that "*A technological system can be both a cause and an effect; it can shape or be shaped by society. As they grow larger and more complex, systems tend to be more shaping of society and less shaped by it.*"[29]

It would appear then that the truth about the role of technology in society would still necessitate some form of technological determinism. Technology may be initially created in certain societies, but as technology advances and is more widely disseminated, the society will depend

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[27] Smith, M. R. and Marx L. "Introduction", *Does Technology Drive History? The Dilemma of Technological Determinism*, Smith, M. R. and Marx L. (eds), Cambridge, Massachusetts: The MIT Press, 1994. p.11.

[28] Heilbroner, R. "Do Machines Make History?" *Technology and Culture*, Vol.8 1967, p.340.

[29] Hughes, *Does Technology Drive History? The Dilemma of Technological Determinism*, op cit; p.112.

further on the technological advances, hence being shaped by the technology. Salomon further explains this point:

> *"Technology is one social process among others: it is not a question of technical development on the one hand and social development on the other, as if these were two entirely different worlds or processes. Society is shaped by technical change which, in turn, is shaped by society. Conceived by man (...) technology eludes his control only in so far as he wants it to. In this sense, society is defined no less by those technologies that it is capable of creating than by those it chooses to use and develop in preference to others."*[30]

Perhaps a better way of explaining the relationship between technology and society is the concept of disruptive and sustaining technologies.[31] Disruptive technologies are advances to the state of the art that generate an entirely new technological paradigm, opening new markets and relying less on existing technologies. On the other hand, sustaining technologies build on the disruptive technologies and improve performance, while their impact tends to be of lesser importance for society as a whole. It could then be said that technological determinism rests on disruptive technologies, while the average occurrence is for society to use technologies and affect sustaining innovations.

But technological advance is not the only determinant of development; which technologies are chosen to be developed by a society also play a crucial role in development. Ancient China was technologically advanced when compared to the European Dark Ages – an often cited example is that of the knowledge of gunpowder. However, this technological advance did not translate into steady development because this technology was used for entertainment (fireworks) and not as a military advantage.[32]

Many philosophers seem to agree on the importance of technology for development. Heidegger's understanding of technology is more metaphysical, but he still recognises that it plays a large role in humanity, an entity almost in and of itself, which even shapes society and the objects and people contained in it.[33] Borgmann, another philosopher of technological

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[30] Salomon, J; as cited by Johnston, A. and Sasson, A. *New Technologies and Development*, Paris: UNESCO, 1986, p.14.

[31] For more about these concepts, see: Anderson, P; Tushman, M. "Technological discontinuities and dominant designs: A cyclical model of technological change", *Administrative Science Quarterly*, Vol. 35, No. 6, 1990, pp. 604–633; and Bower; J. L; Christensen, C. M. "Disruptive technologies: Catching the wave," *Harvard Business Review*, Vol. 73, No. 1, 1995, pp. 43–53.

[32] Diamond, J. M. *Guns, germs and steel: a short history of everybody for the last 13000 years*, London: Vintage, 1998, p.253.

[33] Heidegger, M, *The Question Concerning Technology and Other Essays*, W Lovitt (translation and introduction), New York, Harper & Row, 1997. See also: Dreyfus, H; Spinosa, C. *Highway Bridges and Feasts: Heidegger and Borgmann on How to Affirm Technology*. http://socrates.berkeley.edu/~hdreyfus/html/paper_highway.html

change, claims that humans use science and technology to dominate nature and shape it to fulfil their individual needs by the creation of a technological society.[34]

Economists would also appear to agree that there is a link between both, but the application of this link is a much more debated fact in economic circles. On one hand, Ricardian economics assumes that countries will benefit if they specialise in the production of products for which they have a competitive advantage in labour costs, as this will allow them to sell these goods at a better price in the global market. This model was later reformed and adjusted as the Hecksher-Ohlin-Samuelson model.[35] According to these models, developing countries would be better-off attempting to specialise in some areas of production, and they could still acquire technology through some other means. Other economists have pointed out that these models do not reflect reality, and that countries will still trade between each other even if they already produce the goods.[36] This view is strongly put forward by post-Keynesian economist Jan Kregel, who points out the need of developing countries to be able to produce their own technology; otherwise the technology gap will remain, and possibly expand. The danger of this will be the reliance on the trade and export of single commodities, a formula for disaster according to Kregel. He states that "*developing countries specialization in primary commodities does seem to be accompanied by specialization in technology, and when these countries produce industrial goods they often use technologies that are less efficient than those used in developed countries*."[37]

All of these considerations serve to establish a strong theoretical link between technology and development. But how are these considerations met in real life?

2.2 The Evidence

There are some very strong factual indicators that there is indeed a link between technology and development. To begin establishing this relationship, it would be prudent to make a comparison between the quality of life of different societies located in the same geographical area at different stages of technological development. As discussed earlier, trying to define

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[34] Kellner, D. *Crossing the Postmodern Divide with Borgmann*, 14 December 1997. http://www.gseis.ucla.edu/courses/ed253a/newDK/borg.htm

[35] For an explanation of these models, see: Law, M.T. and Mihlar, F. "Debunking the Myths: A Review of the Canada-US Free Trade Agreement and the North American Free Trade Agreement", *Public Policy Source Papers*, No.11, 1997.

[36] Marangos, J. "International Trade Policies for Transition Economies: The Post-Keynesian Alternative", *Journal of Post-Keynesian Economics*, Vol.23, No.4, Summer 2001, pp.689–704.

[37] Kregel, J. "Technology, Trade and Development"*, Latin American and Caribbean Regional Consultation on Financing for Development*, Miami, November 2000.

development is problematic. Nevertheless, for the purposes of this comparison, health will be used as a useful indicator of the general state of development in a society.

The first example to be used is the Italic peninsula, home of the ancient Roman Empire and of today's Italy, mostly because Rome was one of the wealthiest and more developed civilisations of antiquity. Statistics for Ancient Rome are inaccurate for many reasons,[38] but at least some statistics are possible due to the availability of records, thanks in great part to the Roman obsession with record-keeping. In Ancient Rome, life expectancy was no more than twenty-five years of age,[39] and the infant mortality rate was 319/1000 births, this means, that out of every thousand children, three hundred and nineteen did not survive beyond infancy.[40] In 1950, the average life expectancy was 65 years, and in 1998 the figure had risen to a considerable 78.5 years for both men and women.[41] Life expectancy had risen still further to 79.14 years by the year 2001, with child mortality rates 5.84/1000 during that same year.[42]

Some other statistics for developing countries present more evidence of a steady growth of life expectancy over the second part of the 20th century. In 1950, life expectancy in Egypt was roughly 42 years, while in Costa Rica the rate was 57 years. In 2001, Egypt's life expectancy had risen to 61 years; while Costa Rica's had reached developed country levels at 77.9 years.[43]

There appears to be a marked correlation between economic development and health statistics, such as life expectancy. Most of the countries with high per capita income have high life expectancy rates, but there are exceptions. The United States for example is usually amongst the top five countries in economic indicators, but it has one of the worse health records of all the developed countries, coming 24th in the life expectancy charts for the year 2000.[44] Saudi Arabia also shows very high economic indicators, but has a life expectancy of 64.5 years. On the other

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[38] To view some of the difficulties involved, see: Bocquet-Appel, J.; Masset, C. "Paleodemography: expectancy and false hope", *American Journal of Physical Anthropology*, Vol.99, No. 4, Apr 1996. pp. 571-83

[39] It is important to note that this does not mean that people died at 25 years old, life expectancy is merely a calculation of the average lifespan of a newborn in any given society.

[40] Riggsby, A. *Roman Life Expectancy*. University of Texas Classics Department. http://www.utexas.edu/depts/classics/documents/Life.html

[41] U.S. Census Bureau International Programs Center. *International Database, Gender and Aging: Mortality and Health, 1B/98-2*. Cited in Infoplease.com, "Life Expectancy at Birth for Selected Countries: 1950 and 1998", http://www.infoplease.com/ipa/A0774532.html

[42] U.S. Census Bureau International Programs Center. *International Database, Gender and Aging: Mortality and Health*, Cited in Infoplease.com, "Infant Mortality and Life Expectancy for Selected Countries, 2001", http://www.infoplease.com/ipa/A0004393.html

[43] UNDP. *Human Development Index 2003*, op cit.

[44] WHO *WHO Issues New Healthy Life Expectancy Rankings*, June 4 2000. http://www.who.int/inf-pr-2000/en/pr2000-life.html

hand, countries with low per capita income such as Cuba and China have high life expectancy rates.[45] Some social factors seem to be at work here, and it is possible that access to public health systems may play a big role in health indicators. However, it would be disingenuous to ignore the significant role played by advances in technology in improving health statistics. Immunisation seems to be the main cause of the decrease in infant mortality rates experienced around the world during the last century. Better medical treatment and improvement in medical technology would also have to be considered as strong causes for better health rates. Further support for the role of technology in improving health statistics comes from a report for the World Bank. This Report identified technological advance as the most important determining factor in technical progress, accounting for mortality reductions of 40 to 50% improvement between 1960 and 1990, making technology a more important source of gain than higher incomes.[46]

Another strong indicator that the advancement in technology plays an important role in development is that of education. Enrolment in higher education can be used as a measure in this instance, based on the strong link between education, research, and development, suggesting that countries investing in education will realise technological advances more effectively. The HDI measures the combined enrolment for primary, secondary and tertiary levels of education. In the statistics for 2001, the countries at the top closely match those at the top of the general HDI, with Australia, Belgium, the UK, Finland and Sweden as the top five in this important indicator. Of the top 25 countries on the general HDI, only Hong Kong and Cyprus show disappointing enrolment levels, comparable to countries in the middle of the league.[47]

The HDI also has a section that is more important to the issue of measuring technology. This is a percentage of higher education students enrolled in the natural sciences, engineering, mathematics and computer sciences, and other technology related subjects. These include: architecture, urban planning, transport, and communications; trade and industrial programmes; and agriculture, forestry and fisheries. The results are more surprising in this category, with countries like China, Algeria, Russia, Mozambique, Kazakhstan, and Nigeria showing some of

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[45] Rosenberg, M. "Life Expectancy", *About Guide to Geography*, 2000. http://geography.about.com/library/weekly/aa042000a.htm

[46] Wang, J; Jamison, D. et al. *Measuring Country Performance on Health: Selected Indicators for 115 Countries*, Washington, DC: World Bank, 1999.

[47] UNDP. "Combined primary, secondary and tertiary gross enrolment ratio 200/2001", *HDI 2003*, op cit.

the highest percentages of enrolment in the sciences, but being characteristically lower on the general HDI rankings.[48] This could readily be explained by a lack of curriculum and finance in other areas, such as social sciences and the arts. This hypothesis is supported by an analysis of the expenditure in higher education in relationship to the general spending in all education levels. Unsurprisingly, the highest level of expenditure in tertiary levels in general comes from developed countries, such as Canada, the UK, and the United States. The countries which spend more in science generally allocate a lesser percentage of their education budget to other areas, such as the social sciences and the arts.[49] It would be fair to assume then that countries that cannot afford to spend too much of their resources on tertiary levels of education, are investing most of those resources in science. It would be interesting to see if in the future these countries start to experience positive results from these efforts.

It has been shown that there may be a strong correlation between technological advance and development. However, there is an axiom in scientific thought that says that correlation is not causation, and more convincing evidence is required. The best proof of a direct link between technological advance and development comes from the recently created Technology Achievement Index (TAI), which plays an important role in the 2001 HDR. This index ranks countries according to the creation and use of technology. The top country in this indicator is Finland – just ahead of the United States – mostly because large percentage of its population is connected to the internet.[50] It should be no surprise that of the top ten countries in the general HDI, seven are present in the top ten countries in the TAI, and all are within the top fifteen. Other countries in the top ten are Korea, the UK, and Singapore. Developing Latin American countries are surprisingly very well located, with Mexico, Argentina, Chile and Costa Rica showing up favourably in the list. This elevation could be attributed to the high education enrolment figures, thus marking these countries as possible future leaders of technological advance according to this model.[51]

3. The technology gap

The connection between technological advance and development seems to be strong. One of the results of this relationship is an evident distinction between less developed countries and the

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[48] UNDP. "Tertiary students in science, math and engineering (as% of all tertiary students)", *HDI 2003*, op cit.

[49] UNDP. "Tertiary public expenditure on education (as % of all levels), 1995-97", *HDI 2003*, op cit.

[50] UNDP. *Some developing countries become hi-tech leaders while others fall far behind*, Mexico City, July 10 2001. http://www.undp.org/hdr2001/pr3.pdf

[51] Ibid.

developed world in regards to technology. Richer countries have better technology, while the poorer ones are behind in technological terms. This is the technology gap; the difference in access to technology from the less developed countries to the more developed ones. This technology gap can be measured by assigning a certain "level of technology" to countries, which is the sum of the existing applicable technology and technology that is theoretically feasible, but has not been applied yet for economic reasons.[52] This formula for determining the level of technology is now applied in the UNDP's TAI. A cursory look at the leaders in the TAI indicates a stark separation between rich and poor countries. The leader of the table in 2001, Finland, had a technology index of 0.744. In contrast, Mozambique, the last of the countries shown by the TAI, has a rating of 0.066.[53]

However, these numbers do not indicate the serious consequences that the technology gap has in society. History provides the first warning to this effect. All major technological advances made by a society have meant a competitive advantage against its rivals. From the advantages of irrigation, bronze, and iron in the Ancient world, to the development of armour and castles in medieval Europe, some societies have always held the technological upper hand. This culminated in the conquest of the Americas by European powers. Experts still place a large emphasis on the European possession of advances such as the wheel, gunpowder, and maritime navigation at this historical juncture, and the ease with which great civilizations such as the Aztecs or the Incas fell to the Spaniards.[54]

The industrial and technological advantage during the 19th century also accounts for the massive colonial land grab by the European nations. These technological advances took the shape of steam power, guns, communications, and even quinine. Talking in particular about guns, Headrick states:

> *"European forces were able to conquer large parts of Asia and Africa – empires of truly Napoleonic proportions – at an astonishingly low cost. What made this possible was the crushing superiority of European firepower that resulted from the firearms revolution of the mid-century."*[55]

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[52] Kmenta, J. "Economic theory and Transfer of Technology", *The Transfer of Technology to Developing Countries*", Spencer, D. and Woroniak A. eds; London: Praeger Publishers, 1967, p.39.

[53] United Nations Development Programme. *Human Development Report 2001*, Annex 2.1, p. 46.

[54] For a detailed look at these issues, see: Diamond, *Guns, Germs and Steel*, op cit.

[55] Headrick, D. L. *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century*, Oxford: Oxford University Press, 1981, p.84.

The historical land grab has been translated into a modern world is filled with inequalities, both economic and technological. The many economic indicators studied in the last section easily correlate with economic inequalities. Other statistics would seem more worrying. For example, the combined sales of the world's richest two hundred corporations are higher than the combined gross domestic product of all but ten countries of the world. The combined assets of the three richest men in the United States exceed the combined assets of all of the population of the sixty poorest countries in the world.[56]

These economic inequalities are translated into the technological field even in the most basic advances. A report by the World Bank calculates that two billion people in the world have never had any access to electricity, and that at present 50% of the world's population has no electricity at all.[57] Access to telephony is worse; according to a BBC study, 80% of people have never had access to any telephone. In Africa, out of a population of 740 million, there are only 14 million phone lines, and 80 percent of those are located in only six countries of the area.[58]

Access to even the basic health technology is almost as bad. In the poorest countries in the world about 20% of the population on average has access to sanitation.[59] A recent report notes that 99% of infant deaths in the world take place in poor countries, 70% of those dying of infectious diseases for which there are vaccines.[60] Access to medicines is equally deplorable, mostly because of pricing. Of the total sales of pharmaceuticals worldwide, 61.6 percent are purchased between Europe and North America. Africa purchases only 1.3 percent, the Indian subcontinent 1.8 and China and South East Asia only 5 percent.[61]

Research and development of medicines directed towards the less developed countries is also abysmal. Research into tropical infectious diseases such as tuberculosis, malaria, sleeping

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[56] Moore, M. *Stupid White Men*, New York: Regan Books, 2001, p.168.

[57] World Bank. *Meeting the challenge: mural energy and development for two billion people report*, New York: Oxford University Press, 1999.

[58] Black, J. "Losing ground bit by bit." *BBC Online*, November 1, 1999. http://news.bbc.co.uk/hi/english/special_report/1999/10/99/information_rich_information_poor/newsid_472000/472621.stm

[59] World Bank. *World Development Report 2000/2001: Attacking Poverty*, New York: Oxford University Press, 2001, pp.276-277.

[60] Shann, F; Steinhoff, M. C. "Vaccines for Children in Rich and Poor Countries", *Paediatrics*, Vol.354, September 1999. http://www.childrensvaccine.org/files/Stienhoff-Paediatrics-m.eup-1999-3.32.pdf

[61] UNDP. *HDR calls for R&D, differential pricing and IPR support to bridge the tech divide*. 10 July 2001. http://www.undp.org/hdr2001/pr4.pdf

sickness, and leishmaniasis is almost non-existent; one study comments "*Between 1975 and 1997 out of 1,223 new drugs developed only 13 (1%) were to treat tropical diseases*."[62]

Even access to agricultural technology is limited. The average of fertiliser consumption in the last ten countries of the HDI is of 5.76 kilograms per hectare of arable land, while the average for the top ten countries is of 492.3 kg per hectare.[63] In Norway, there are 163 tractors per hectare of arable land; in the UK there are 79. In countries like Cambodia, Cameroon, Haiti and Ethiopia the figure does not even reach one tractor.[64]

It is almost needless to say that the gaps in research and development expenses also act as indicators of the technology gap, as poor countries will not have the opportunity to acquire technology by themselves and develop the tools to redress this imbalance. In 1993, 84 percent of the world's spending in R&D was concentrated in only ten of the richest countries of the world.[65] The percentage of spending in research and development in the last 10 countries in the HDI for which there are statistics, averages 0.37 percent of the total GNP, while in the top 10 the average is of 2.34 percent of the total GNP.[66]

The migration of scientists and other professionals from less developed countries to the developed world, colloquially referred to as the "brain drain," is another big problem that only enhances the technology divide. The main problem is that many of these professionals are educated initially in their countries and later migrate, which means that the countries lose large amounts of money in education investment, which will ultimately benefit other countries. While this is a current problem that may complicate the development indicates proposed here, it should be noted that the "brain drain" is not always detrimental or without collateral benefit. The reason for this is that many of the experts that are trained in developed countries will return to their nations of origin, thus advancing the level of training available to new researchers and scholars. Nevertheless, the UNDP calculates that in India alone, the "brain drain" has cost the country a total of two billion dollars a year.[67] There is an actual policy in many developed countries to attract qualified specialists from other countries, such as teachers, nurses and

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[62] Médecins Sans Frontières. *What is the Campaign?* 2001. http://www.accessmed-msf.org/campaign/pillars.shtm

[63] UNDP. *Fertilizer consumption (kg per hectare of arable and permanently cropped land), 1998*, 2001.

[64] UNDP. *Tractors in use (per hectare of arable and permanently cropped land), 1998*, 2001.

[65] Castells, M. *The Rise of the Network Society*, 2nd edition, Oxford: Blackwell Publishers, 2000, p.124.

[66] UNDP. *Research and development (R&D) expenditures: as % of GNP, 1987-97*, 2001. http://www.undp.org/hdr2001/indicator/indic_244_1_1.html

[67] UNDP. *"Brain Drain" costs developing countries billions*, 10 July 2001. http://www.undp.org/hdr2001/pr5.pdf

information technology (IT) professionals. The UK has recently implemented a policy of providing visas to qualified workers from overseas to work in Britain, following a similar scheme practiced in the United States.[68]

4. Do developing countries need technology?

It would seem that technology is now an integral part of the human experience. With technology we have harnessed our environment and shaped it to suit our needs. Since the discovery of fire, human history has made a steady progression towards the advancement of technology, of finding ways to do things faster, and of shaping the world to suit their needs.

Technological change has now become overwhelming; it seems like every time one reads the papers there is a new technological advance advertised, more ways of making our lives easier, longer and better through the application of technology. It is now hard to think of a world without telephones, electricity, cars, television and the internet. Humans are fast becoming more and more dependent on technology for every aspect of their lives.

But not everybody is happy with this scenario. Despite all the evidence that points towards a strong relationship between technological advance and development, there are many voices that disagree with the advantages brought by technology; New Age gurus, environmental advocates, alternative medicine practitioners, anti-globalisation protesters, religious fundamentalists, ideologues and academics; the number of people dissatisfied with the modern technological society appears to be growing every day.

The criticisms of technology have to be taken seriously because one of the starting assumptions of the present work is that technology is a positive thing for society and must be pursued by any country that wants to become developed. Because less developed countries are less technologically advanced, one would expect that they would be closer to the ideal espoused by those who criticise technology.

Why is technology so reviled in many sectors? After all, it provides health, electricity, telephones and the internet. Paraphrasing the famous line in Monty Python's *Life of Brian*, apart from sanitation, medicine, education, wine, public order, irrigation, roads, a fresh water system, and public health, what has technology ever done for us?

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[68] Carvel, J. "Overseas staff plug the gaps", *The Guardian*, March 21 2001. http://society.guardian.co.uk/commongood/comment/0,8146,460101,00.html

Scepticism towards technology is generally referred to interchangeably as technophobia or Neo-Luddism. Neo-Luddism is a philosophical movement that attacks certain negative aspects of technological advance in society and not all technology. In the words of prominent Neo-Luddite academic Chennis Glendinning, "*What we oppose are the kinds of technologies that are, at root, destructive of human lives and communities*."[69]

Philosophers from the Frankfurt School are generally held to be the precursors of modern technophobia. Marcuse, for example, offers scathing criticism of modern science and technology, mostly fuelled by his political ideas. Marcuse believes that instrumentalism (his term for science and technology) goes against nature, and he advocates a reworking of science and technology to create a new shift in commonly held views.[70] It is his ambition to create new concepts so that technology could be a part of nature, and not work against it. Habermas attacks Marcuse's idea of a new technology, although he does not like the present system of technological advance. For him, technology is simply a means of communicating social power and control.[71] Even Heidegger considers that the individuals serve as mere raw material for technology.[72]

Famous architect and intellectual Lewis Mumford, sees in technology an anathema to humanity. He often laments the development of machinery as detrimental to the human spirit: "*The machine itself makes no demands and holds out no promises: it is the human spirit that makes demands and keeps promises.*"[73] Mumford explains that "*One of the by-products of the development of mechanical devices and mechanical standards, has been the nullification of skill.*"[74] This is a common complaint from philosophers and intellectuals opposed to technological advance. The machine is seen as the opposite of humanity; something in the artificiality makes it an anathema of everything human. For these critics, the quality of being human transcends tool-making as the defining feature of humanity – self-consciousness is the defining characteristic.

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[69] Glendinning, C. "Notes Towards a Neo-Luddite Manifesto", *Utne Reader*, Vol.38, Issue 1, 1990, pp.50-53.

[70] Marcuse, H. "The New Forms of Control", *Philosophy and Technology: The Technological Condition, an Anthology*; Sharff R. and Dusek V. eds; Oxford: Blackwell Publishing, 2003, pp.405-413.

[71] Feenberg, A. "Marcuse or Habermas: Two Critiques of Technology", *Inquiry* 39, 1996, pp.45-70. http://www-rohan.sdsu.edu/faculty/feenberg/marhab.html

[72] Heidegger, op cit.

[73] Cited by: Pace, G. *Lewis Mumford: Megathinker and Master of the Metaphor*. http://www.uky.edu/Classes/PS/776/Projects/Mumford/mumford.html

[74] Mumford, L. *The Myth of the Machine: Technics and Human Development*, New York: Harcourt Brace Jovanovich Inc, 1967, p.13.

Besides these criticisms, it would appear that technophobia assumes that technology in itself is not negative, but that it can be misused. This is the concept of technology neutrality. Proponents of technology as a valuable tool tend to assume that technology in itself is neutral, and that its use or misuse is independent of its development. Philosopher Karl Jaspers has noted that "*[Technology] is only a means, in itself neither good nor evil. Everything depends upon what man makes of it, for what purpose it serves him, under what conditions he places it*."[75] On the other hand, most technophobes and Neo-Luddites start from the assumption that technology is not neutral. As put forward by the Technorealists, a group of technology critics:

> *"A great misconception of our time is the idea that technologies are completely free of bias -- that because they are inanimate artifacts, they don't promote certain kinds of behaviors over others. In truth, technologies come loaded with both intended and unintended social, political, and economic leanings."*[76]

This view of technology as being not neutral seems to be shared by many other technophobes.[77] As difficult as it is to establish certainty in these types of debates, it would appear that the view that technology is neutral is closer to reality. Technology is certainly prone to being subjected to "evil" uses: purposefully, by omission, through short-sightedness, or through sheer human stupidity. Indeed, many of the criticisms of technological advances are warranted. Technological creations are responsible for many controversies of our time, from environmental pollution to the creation of devastating weapons. Ecological problems caused by technology cannot be underestimated, and they threaten to increase in the future in the shape of long foretold ecological disasters such as global warming or the depletion of the ozone layer. Unscrupulous governments and corporations have indeed misused technological advances, and technology indeed facilitates increasingly efficient ways of waging war.

Nevertheless, technology can also help reduce those environmental concerns. Cheap energy and clean transportation could be just some of the technological advances that could help humans develop a cleaner and better future. The decoding of the human genome is heralded as opening the door to the largest medical revolution ever witnessed. Yet technophobia is still a very strong cultural and political presence in modern society, particularly in Western developed countries. This is epitomised by the almost dogmatic denial of the potential benefits of biotechnological

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[75] As cited by Imamoto, S. *Technology and Labor in Jaspers's Philosophy*. 1998. http://home3.highway.ne.jp/~imashu/KJSNA.htm

[76] Murphy, R. *Technorealism Overview*, 1998. http://www.technorealism.org/

[77] For example, see, Sale, K. "Lessons from the Luddites", *The Nation*, June 5 1995. http://www.ensu.ucalgary.ca/~terry/luddite/sale.html

advances that can be found in large sectors of the environmental lobby. This denial goes as far as the potentially beneficial technologies to the developing world on the basis that this technology is damaging in one way or another. This is often done without asking for the opinion of the people in those countries to ascertain whether there is any desire to acquire the technology in the first place. But sadly the opposite is also true; technology is often pushed upon poor nations even if it has been banned in developed countries. It has been reported that as many as 25 million workers in poor nations may suffer health problems from pesticides originating from developed nations. [78]

There is a need to reach a middle ground. Developing countries should be empowered into making their own decisions about what technology they want to acquire, something which is sadly missing at the moment. The endless number of doomsday scenarios coming from some sectors of the developed world must be weighed against the actual need of developing nations. It seems that some technophobic groups find it easy to pontificate against technology while having access to electricity, clean water, and modern medicine. It seems easy to criticise technology and merely inform the developing nations of their perceived needs. Some of the critics of technology may very well be justified in making assumptions about the needs of the rest of the world and many environmental preoccupations are certainly worthy of consideration, but to try to assume that all technological advances are not desired seems culturally and politically arrogant and unwarranted. In the end, it is the people of the developing world who should determine whether they want to have access to technology or not. Nevertheless, extreme technophobic dreams of a future without technology seem suspiciously like a formula for continuing the vicious circle of poverty.

There cannot be any doubt then that there is need for technology in the developing world: from internet access to the knowledge to increase agricultural production; from health-related technology to communications infrastructure. Many of the development indicators that have been covered here would improve immensely if the people in the less developed world could have access to some minimum standards of technology. But not only raw technology is required, some capacity to understand the technology in order to establish whether or not it should be adopted is also necessary. The UNDP expresses this eloquently by saying that "*Not every country needs to develop cutting-edge technologies, but every country needs domestic*

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[78] Environmental Protection Agency. *Stop the Export of Banned Pesticides*, EPA Action Report EPA06. http://govinfo.library.unt.edu/npr/library/reports/EPA6.html

capacity to identify technology's potential benefits and to adapt new technology to its needs and constraints."[79]

If we conclude, based on the evidence presented so far, that technology and development are interlinked, then the answer about whether or not developing countries really need development should answer itself. It should be obvious that developing countries should attempt to obtain technology. But how is this done?

5. Developing technology

Assuming that developing countries require technology, and that technology translates itself into development, then developing countries should attempt to develop technology. Unfortunately, technology simply does not appear from thin air.

How is technology developed? This is not the place to offer a detailed account of the history of technological development, but it may be easy to see how today's developed nations built their technological dominance.

Arguably, modern technology in developed Western nations is a direct result of the Scientific Revolution that took place almost 400 years ago during the Enlightenment. This revolution was set in motion by the writings of natural scientists and empirical philosophers of the 17th century, such as Francis Bacon, John Locke, Gottfried Wilhelm Leibniz, and Isaac Newton.[80] The ideas embraced by this period of history made technological advance possible by placing reason and the application of knowledge as the highest standards, and turning inquiry into the norm in society. Paraphrasing Francis Bacon, knowledge became power.

The ideas set in motion by the Enlightenment went hand in hand with another revolution, the creation of modern payment systems and modern financial institutions, which assisted the fast development of commerce and international finance hubs in Amsterdam and London.[81] All of those advances in society made possible the Industrial Revolution in the 18th century, an era of technological advances that allowed Western nations to overcome their competitors. The Industrial Revolution heralded the change of low-technology to high-technology advances, as society moved from agrarian and handicrafts technologies towards industrial and machine-

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[79] UNDP, *Human Development Report 2001*, op cit, p.37.

[80] For more on the Enlightenment, see: Israel, J. *Radical Enlightenment: Philosophy and the Making of Modernity 1650-1750*, Oxford: Oxford University Press, 2001.

[81] For an excellent fictional account of the development of international finance, see: Stephenson, N. *Quicksilver*, London: Random House, 2003.

based technologies. [82] With machine-based technologies in place, European countries became economically powerful, and by all measurable standards the route towards modern development was well under way. The technological advances generated by the Industrial Revolution became more evident with the advent of the Second Industrial Revolution that took place during the late 19th and early 20th centuries, with further achievements in the chemical, petroleum, electrical, and steel industries that prompted the invention of many modern high-technologies, such as the internal combustion engine, airplanes, the telephone, and the light bulb.[83] There are those who argue that we are in the middle of a Third Industrial Revolution,[84] consisting of biotechnology and ICTs.

The common denominator of these different technological stages is the fact that technological inventions follow a steady and incremental flow from basic low technologies to high-technological innovations, a path that has its origin in the aforementioned Enlightenment, which explains why Western countries are technologically advanced in the present. It seems like an early start in the technology race may produce dividends later on because subsequent developments are made relying on existing technologies. Nevertheless, the steady advance of technology in the West still does not answer the vital question of how technologies are developed in the first place.

The answer lies in the dichotomy between innovation and imitation as gears that move technological advance. Innovation is the clear-cut generation of a new technology, while imitation is the widespread adoption and adaptation of these technologies. With the large number of technological advances in the West, one would expect to see innovation taking place all the time, but this is actually not the case. Jared Diamond makes the argument that true innovators are few and far between. Archimedes, Guttenberg, James Watt, Thomas Alba Edison and the Wright brothers are the exception to the rule; they are just some of the very few true original inventors. After them, there are large numbers of anonymous and less celebrated copiers and imitators, who take the work of a true innovator and improve on their innovations in incremental advances.[85] For Diamond, what makes a society more likely to develop and become

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[82] For more on the Industrial Revolution, see: More, C. *Understanding the Industrial Revolution*, London: Routledge, 2000.

[83] "Second Industrial Revolution", *Wikipedia*. http://en.wikipedia.org/wiki/Second_Industrial_Revolution

[84] For example, see: Finkelstein, J. *Windows on a New World: The Third Industrial Revolution*, Westport CT: Greenwood Press, 1989.

[85] Diamond, *Guns, Germs and Steel*, op cit; pp.241-243.

technologically sophisticated is the openness to embrace the discoveries of those few innovators. He says:

> *"Necessity is the mother of invention. That is, inventions supposedly arise when society has an unfulfilled need: some technology is widely recognized to be unsatisfactory or limiting. Would-be inventors, motivated by the prospect of money or fame, perceive the need and try to meet it. Some inventor finally comes up with a solution superior to the existing, unsatisfactory technology. Society adopts the solution if it is compatible with the society's values and other technologies."*[86]

This means that societies that are more open to the widespread imitation of an originally innovative technology obtain an advantage and are rewarded with more development – imitation drives technology.

This idea can be easily corroborated throughout history; an example can be seen in the now famous solving of the longitude problem, performed by a humble self-taught clockmaker from Yorkshire called John Harrison between 1736 and 1775. The longitude problem had baffled some of the best minds of the period, as there needed to be a way to measure longitude accurately. This was something which was not possible at the time, creating all sorts of problems to the naval powers, and in particular Britain. Harrison built five different clocks that could be carried to the sea to provide accurate measurements of the time at Greenwich, thus enabling calculation of the distance travelled.[87] The story of Harrison's perseverance and sheer inventive genius is by itself a great illustration of the innovative process. What is more important to the present work, is that his clocks, (in particular the most successful one, his last watch named H-5) were immediately subjected to a process of reverse engineering by other artisans and watchmakers. One of these watches, built by another watchmaker named Larcum Kendall, made a famous trip with Captain Cook in 1772-1775. The original problem was that the watches were too expensive and could not be given to all of the ships making part of the vast British Navy. Several other watchmakers took the challenge and were able to mass-produce variations of Harrison's watch for affordable prices.

Philosophers and historians of science fully recognise that scientific advances and technological changes are not only incremental, but rely on the work of few innovators to drive them forward. Thomas Kuhn is perhaps the best known proponent of the idea of development by leaps, or

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[86] Ibid; p.242.

[87] For a full account of Harrison's invention, see: Sobel, D. *Longitude*, London: Fourth Estate, 1998.

what he calls paradigm shifts.[88] This view indicates that there are numerous and considerable changes and adaptations of scientific thought within a paradigm, and that these later accumulate until a new system is created.[89] The same would apply to technology, because it is the practical application of scientific knowledge.

The fact that a few innovations are needed to kick-start development holds the key to understanding the reason why the West is industrialised to the extent it is today and why developing countries are finding it more difficult to generate their own technology. The initial technological innovations that prompted the Industrial Revolution in the 18th century gave those few countries that adopted these developments the proper environment to generate further innovations. Once the Industrial Revolution produced some key innovations, the only thing that was needed was to improve those innovations to make them more efficient. For example, the steam engine was a great innovation, but the initial engines were too expensive to operate because they were not efficient enough.[90] During the years following the invention, developers did not create new engines; rather, they concentrated in increasing the efficiency of the existing ones. Therefore, the amount of coal required to operate a steam engine dropped from 30 pounds of coal per horsepower hour in 1769, to 2.5 in 1850.[91]

This also helps to explain partially why Europe beat other cultures in the technological race during the 17th and 18th century. Arguably, Chinese, and Arab cultures had attained considerable technological advances by that time. However, they did not make that important leap from low-technology to high-technology. This has been explained by different means, but it seems like there was something missing in Chinese society that stopped them from developing the type of useful technology that helped Western nations in their development. Leibniz expressed some of these differences as early as the 17th Century, when he made the following remarks about Chinese culture:

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[88] Kuhn, T. *The Structure of Scientific Revolutions*, Chicago, Chicago University Press, 1996.

[89] Rosenberg, A. *Philosophy of Science*, London: Routledge, 2000, pp.146-147.

[90] Landes, D. *The Unbound Prometheus: Technological Change and Industrial Development in Western Europe from 1750 to the Present*, 2nd Edition, Cambridge: Cambridge University Press, 2003, p.99.

[91] Ibid.

> *"In profundity of knowledge and in the theoretical disciplines we are their superiors. For besides logic and metaphysics, and the knowledge of things incorporeal, which we justly claim as peculiarly our province, we excel by far in the understanding of concepts which are abstracted by the mind from the material."*[92]

Similarly, China may have been the victim of its own success at low technologies. This theory is called the high level equilibrium trap, and it states that Chinese society was too efficient in non-mechanised low-technologies such as agriculture and manufacture, so a transition to mechanisation was unprofitable.[93] Other theories point towards the availability of some raw resources like coal in Europe that were not so readily available in China.[94]

Whatever the cause for the initial high technology leap in Europe, the advantage of being the first innovator, the first mover, cannot be underestimated. After all: "*The adoption of new technologies is notoriously slow. The initial incarnations of new ideas are often expensive and bug-infested*."[95] Developing nations have had to contend with this fact, always trying to catch up with high technologies that were generated in the West, commencing with the Industrial Revolution, with each of the new technological paradigms widening the gap.

The capability to create new technologies in modern times becomes an expensive exercise because the cumulative nature of technology means that the more advanced the technology, the more expenditure in research and development is required to develop it, and the more expensive it becomes to maintain the dominance.[96]

History shows that a society needs to go through several steps of the development of high-technologies to achieve the levels of development seen in European nations. Although Japan and the United States were latecomers to the European Industrial Revolution, both made early efforts to adopt some of the preliminary high-technologies as early as the 19th century. The United States had entered its own Industrial Revolution by the 1840s,[97] while Japan's effort to

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[92] Leibniz, G. W. *Novissima Sinica*, 1679.

[93] For more, see: Little, D. "Development Traps in Traditional and Modern China", *Association for Asian Studies*, April, 1990. http://www-personal.umd.umich.edu/~delittle/CHINMOD3.PDF

[94] Pomeranz, K. *The Great Divergence: China, Europe, and the Making of the Modern World Economy*, Princeton NJ: Princeton University Press, 2001.

[95] Greenwood, J. "The Third Industrial Revolution: Technology, Productivity, and Income Inequality", *Economic Review*, No.2, 1999. http://www.clevelandfed.org/Research/review99/third.pdf

[96] For some evidence in the automotive industry, see: Okabe, M. "Relationship Between Domestic Research and Development Activity and Technology Importation: An Empirical Investigation of Japanese Manufacturing Industries", *Asian Economic Journal,* 17 (3), 2003, pp.265-280.

[97] Ibid.

become industrialised date from as early as the 1860's.[98] By the Second World War, both countries had technology levels that rivalled those of Europe, and often overcame them.

More recently, South Korea is a society that has become technologically developed in a relatively short time. However, even here some early head start has shown to pay dividends later on. "*The introduction of Western culture and technology to Korea began around 1880. Until 1910, the introduction of modern technology was dominated by Japan and the Western powers*."[99] Although the country was devastated by the Korean War, there was considerable input of American know-how operating on the existing infrastructure introduced by the Japanese. After that, South Korea conducted an imitation policy based on the acquisition of imported technologies and some government investment in research and development.

It is important to point out that the early head start in technological advances does not necessarily translate into development. An example of this is Argentina. At the beginning of the 20th century, this country was one of the most developed in the world, ranking thirteenth amongst the richest nations of the world. Buenos Aires had one of the highest densities of telephones per capita by 1913, and by 1929 it was fifth in the number of automobiles per capita. By 1987 all of these figures had fallen considerably, and the country is now immersed in a tremendous economic crisis. [100]

Regardless of this, there cannot be any doubt that the initial step of acquiring technology is the most important one. How is this done? The critical means and strategies by which developing nations, and in particular LDCs, can acquire technology will be explored in the next chapter.

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[98] Chamarik, S and Goonatilake, S. *Technological independence: The Asian experience*, New York: United Nations University Press, 1994, Chapter 6.

[99] Ibid, Chapter 3.

[100] DeLong, J. B. *Slouching Towards Utopia?: The Economic History of the Twentieth Century*, 1991. http://econ161.berkeley.edu/TCEH/Slouch_divergence5.html

Chapter 2. International Technology Transfer

> *"If man realises technology is within reach, he achieves it, it's damn near instinctive."*
> ***Ghost in the Shell***

The last chapter presented evidence that developing countries need technology to become developed, but because high technologies were fist implemented in Western nations, they must first acquire technology in order to become independent and generate their own innovations. This chapter will deal with the concept of the modern international system of technology transfer.

Literature covering technology transfer problems has been growing in number in recent years[101] after a period of silence caused mostly by the fact that the main efforts to establish an international technology transfer code failed in the later part of the 1980s, as will be described in this chapter. Despite some exceptions dealing with the specific issues of licensing of technology and some changes to European competition legislation, the international system of technology transfer to developing countries has been inadequate, and has not progressed in recent years. This chapter attempts to redress this trend by bringing the issue of international technology transfer to the forefront of the debate, and it will try to address some of the questions raised, by proposing technology transfer as one of the most viable solutions that the developing world could adopt towards its development.

1. Introduction to Technology Transfer

1.1 Definition

The last chapter concentrated on the concept of innovative technology, and it also emphasised the fact that innovation is difficult, and that technological advance often relies on imitation, adoption, dissemination and improvement of existing technologies. Chamarik and Goonatilake identify five distinct stages that a society has to take in order to generate its own innovations. They are:

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[101] Although most of it is related to management of licensing agreements, and not specifically about some of the legal issues that will be raised here. For example, see: Megantztz, R. *Technology Management: Developing and Implementing Effective Licensing Program*s. Indianapolis, IN: John Wiley & Sons Inc, 2002.

"1. Acquisition of proper skill and know-how.
2. Maintenance.
3. Repair (including minor improvement).
4. Design.
5. Beginning of domestic production."[102]

The initial stage is then one of the most important processes for a country looking for means to generate technology. There are several mechanisms that can assist developing countries to acquire technology from industrialised nations. These mechanisms come within the concept of technology transfer, which can be broadly defined as "*the process by which commercial technology is disseminated*".[103] It is important to point out that commercial technology in this context refers to "proprietary" technology, meaning technology that can be owned. Examples of proprietary technology are Intel's Pentium chip, pharmaceuticals, computer software, machinery, etc. Non-proprietary technology is that which is widely available to the public by being in the public domain or by being licensed through non-proprietary means, something that will be dealt with in more detail later on. Examples of this type of technology can be seen in scientific journals, books in the public domain, open source software, and even cloning technology – technology that was published in several journals and has been replicated by many laboratories around the world.

In the global economy, proprietary technologies are subject to being owned by a intellectual property. In the strictest sense, intellectual property deals with the protection of intellectual creations. As described by Bainbridge, intellectual property is:

> *"…that area of the law which concerns legal rights associated with creative effort or commercial reputation and goodwill. The subject matter of intellectual property is very wide and includes literary and artistic works, films, computer programs, inventions, designs and marks used by traders for their goods or services."*[104]

The way in which this protection is made available is by providing a limited right of ownership over intellectual creations, and by the existence of legal remedies in case such creation has been misused, copied or appropriated by somebody who is not entitled to do it by means of authorship or ownership of the right.[105] Following chapters will deal with some of the issues for

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[102] Chamarik, S and Goonatilake, S. *Technological independence: The Asian experience*, op cit.

[103] Muchlinski, P.T. *Multinational Corporations and the Law*, Oxford: Blackwell Publishers, 1995, p.426.

[104] Bainbridge, D. *Intellectual Property*, 4th Ed. London: Pitman Publishing, 1999, p.3.

[105] This work will be centred on patents, copyright and databases. It will be assumed that the reader is familiar with some of the basic concepts of intellectual property. For an excellent introduction to the basic issues, see: Cornish, W.R. & Llewelyn, M. *Intellectual Property*. 5th Edition, Thomson: London, 2003, Chapter 1, pp.3-50.

developing countries of intellectual property. What the reader must keep in mind for now is the fact that intellectual property allows the owner to transact with its property, be it by granting rights to use it, or in some cases the owner can even transfer the ownership of the work entirely.

Technology transfer is then centred on the concept of the commercial transmission of technology owned by intellectual property. Nevertheless, it must be pointed out that technology can be transmitted both by commercial and non-commercial transfers of technology. Commercial technology transfer refers to any transaction between two undertakings, in which a type of economic exchange is performed between parties, but is not necessarily monetary. Non-commercial technology transfer takes the form of any agreement where the technology owner provides the recipient party with technology without expecting any monetary returns, even if it is done expecting some other types of benefits, such as market benefits and tax breaks.[106]

It is important to point out as well the difference between low-technologies and high-technologies on the supplying and recipient sides. Conventional technology is more evenly distributed and used (textiles, food processing, pulp, beer production), but there are few suppliers of high technology (chemicals, aerospace, computer chips, and so on), and fewer countries that can use and absorb this technology.[107]

For there to be a transfer of technology in the terms mentioned, the transfer must take the form of a transaction. This transaction need not necessarily be a contract, but it must involve the communication between the owner of the technology and the recipient. Brooks comments that, "*Technology transfer differs from ordinary scientific information transfer in the fact that to be really transferred it must be embodied in an actual operation of some kind*."[108] This is an important distinction because it means that the study of international technology transfer systems will not have to deal with a large number of non-proprietary systems of technology transfer, such as dissemination by the internet, or journal articles.

In the international context, technology transfer has further implications given the technological gap that has already been described. Some authors have expressed concern at the state of things, therefore they convey that there is a moral responsibility from developed nations to provide

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[106] OECD. *North/South Technology Transfer: The adjustments ahead*, Paris: OECD Publications, 1981, p.19.

[107] Ibid; p.428.

[108] Brooks, H. As cited by: OECD. *North/South Technology Transfer: The adjustments ahead*, op cit; p.18.

viable transfer of technology mechanisms from to the poorer nations, particularly LDCs.[109] If proprietary technology is the subject of ownership by means of intellectual property rights; the issues of international technology transfer are closely linked to the mechanisms that exist for the protection of the ownership of ideas. For this reason, the international system of technology transfer will have to be framed within the borders set by international intellectual property mechanisms. Because of the operating definition of technology transfer preferred in this work; only legal means of acquiring technology can be covered within this framework. Other systems of acquiring technology, such as reverse engineering, piracy, and other imitative practices, are not covered by the definitions above and therefore are will not be considered when discussing the transfer of technology.

Because the rewards for technology are premised upon an ownership model, it is generally in the best interest of the owners of intellectual creations to secure their technology through monopolistic rights. That is why a structured model of technology transfer is of great interest to them, as it can help them to transfer certain types of technologies to the developing world without fear that they will be illegally copied or distributed. This being the case, Multinational Enterprises (MNEs) are going to keep their hold on technology to maintain an economic advantage and increase their profits. Owning technology also means that MNEs will have a considerable bargaining advantage when negotiating technology transfers to developing countries.

While talking about the definition of technology transfer, it must be pointed out that the term is used also to refer to something slightly different, which may lend itself to confuse readers. In some of the specialised literature, the term technology transfer has become synonymous with the transfer of knowledge generated in a university into the commercial realm, particularly through spin-off companies.[110] The author prefers the term "knowledge transfer" when talking specifically about universities. Therefore, whenever technology transfer is mentioned in this work, it must be assumed that the wider and more inclusive definition is being used.

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[109] Jeremy, D. J. "Some of the larger issues posed by Technology Transfer*", International Technology Transfer: Europe, Japan and the USA, 1700-1914*, Jeremy, D. J. ed; Cheltenham: Edward Elgar Publishing House, 1991, pp.1-3.

[110] For example, some define technology transfer as "*the transfer of research results from universities to the commercial marketplace for the public benefit*." See: Council on Governmental Relations. *The Bayh-Dole Act a Guide to the Law and Implementing Regulations*, 1999. http://www.ucop.edu/ott/bayh.html

1.2 Methods of technology transfer

Technology can be transferred in many ways. The draft International Code of Conduct for Technology Transfer (TOT Code), which will be seen in more detail later, lists several, such as:

- Assignment, sale or licensing of industrial property.
- The transfer of "know how" and technical expertise in fields such as design, plans, models, etc, of the technology. This usually involves technical advice and expertise.
- The provision of technical knowledge to install and use machinery or equipment.
- The transfer of technology through industrial co-operation agreements.[111]

It is interesting to point out that technology transfer through the TOT Code agrees with the definition of technology transfer provided above as only dealing with transactions of proprietary technology; non-commercial technology transfers are not included.[112] Of the methods described above, the most common means of transferring technology are the following: licensing agreements; joint ventures with a local partner; or by doing an internal transfer to a subsidiary in a country, also known as Foreign Direct Investment (FDI).[113] In more detail, these are:

a) Licensing is a transfer of technology by means of a contract assigning intellectual property rights. This takes place when the owner of technology contracts with an undertaking (whether a private or public business) in the receiving country to allow them to make use of the technology without infringement. A licensing agreement may also transfer protected or unprotected know-how, or may include in its provisions the training of specialists, transfer of procedures, and technical assistance.[114] The granting of a licence assumes that the transmitting party owns the technology by means of intellectual property protection and is willing to allow the receiver to make use of it by any of the cited means. To be able to maintain control of the technology, the owner will draft and negotiate the licence and place a number of restrictions on the licensee. An appealing restriction takes the shape of the site licence, which restricts the licensee to be able to exploit the licence only within in a determined territory.[115] Many other restrictions exist,

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[111] UNCTAD. *Draft International Code of Conduct on the Transfer of Technology*, June 20, 1985, Chapter 1.3.

[112] Muchlinski. op cit; p 427.

[113] Ibid.

[114] Pfaff, D. "International Licensing Contracts", *The transnational law of international commercial transactions,*, Horn, N. and Schmitthoff, C.M. eds; Dordrecht: Kluwer, 1985, pp.200-202.

[115] Townsend, M. "The case for site licenses", *European Competition Law Review*, Vol.20, No.3, 1999, pp.169-174.

varying from controls in the time in which the licensee can obtain the licence to restrictions on the type of technology that will be transferred.

b) Joint Ventures are slightly different from licensing agreements. A joint venture is "*an agreement between firms to work together on a project for mutual benefit.*"[116] Both joint ventures and licence terms are non-exclusive, and they are best applied where there is an existing large company or the adequate infrastructure to make use of that technology. Joint Ventures imply the existence of a certain amount of co-operation between the owner of the technology and the recipient. Once an agreement to transfer technology has been reached, the MNE usually imposes restrictions on the terms of the technology transaction, just as with licensing. These restrictions may come in two types. The first are restrictions on the commercial policy of the recipient (for example: the MNE may ask the recipient to purchase certain types of materials or machinery, usually owned by itself; or the MNE may impose restrictions on the duration of the agreement, etc). The second are restrictions on the use of the technology. This may include clauses like confidentiality agreements, agreements not to contract with competitors of the multinational, restrictions on research and development undertaken by the recipient, etc. [117]

c) Foreign Direct Investment. The MNE may forego any sort of licensing or joint venture with undertakings within the country and may decide to operate directly with its own resources, usually opening a subsidiary in the recipient territory. This is an appealing way to handle operations for a large owner of technology, as multinationals may prefer to invest directly into a less developed country because there is no sufficient skilled labour to undertake a profitable use of the technology, and the MNE is more likely to maintain control of the technology without fear of the loss of profits by means of intellectual property infringement.[118]

1.3 The need for technology transfer regulation

It must be noted that in all of the methods listed above, the technology owner maintains strict control over the technology, be it by legal mechanisms or by direct intervention. In most of these restrictive practices, the imbalance of power in existing technology transfer transactions is shown to its full extent, as the owners have the bargaining dominance and they use it to their advantage. It is evident that while the technology remains firmly in the grasp of the owners,

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[116] Investor Guide. *Investor Words: Joint Venture*. 1999. http://www.investorwords.com/p1.htm#partnership

[117] Muchlinski. op cit; pp.433-435.

[118] Ibid.

developing countries have fewer possibilities to make use of that technology for their own interests. It could be said then that unregulated technology transfer is simply a mechanism available to enterprises to dominate an underdeveloped market, and that the possibility of this technology being applied by the country to a wider extent is minimal. This is why there is need for some sort of international framework that will dictate some practical procedures that may allow developing countries to make use of this technology in a less restrictive manner.

A study conducted by the World Intellectual Property Organisation (WIPO) during the 1970s highlighted some of the problems faced by developing countries when attempting to acquire technology by existing means.[119] There were many important structural, political, and economic problems identified, including the problem of technology dependency by developing countries, the high price of acquiring technology, the lack of mechanisms to achieve fair pricing of technological products, the lack of legal and technical knowledge in those countries, and many others.[120] Amongst the many situations described, perhaps the most important was the lack of a legal framework for technology transfer transactions. It was understood by the drafters of the report that such lack of a legal framework diminished the negotiating power of developing countries. The report goes on to conclude that:

> *"If obstacles to the transfer of technology are to be removed, if fair and reasonable terms to its access are to be negotiated, if technology is to be utilized properly and is to be suitably developed, if indigenous technology is to be created, if commercial practices are to be adapted and if abuses are to be prevented – so as to play a significant role in the accelerated development of developing countries – the bargaining position of potential technology acquirers in developing countries when dealing with enterprises, governmental and private, in developed countries must be strengthened."*[121]

It is unfortunate that some of the more pressing problems that were described are still present, an indication of the lack of viable solutions available in this area. Developing countries still face high prices for the technology; developing countries still find themselves in disadvantageous negotiating positions in technology transfer negotiations with MNEs; developing countries still find themselves depending on technology manufactured and owned by developed nations. Developing countries are faced not only with these problems a quarter of a century after this report was first released, but they also face new challenges. Developing countries find themselves subject to a much stricter regime of technology ownership; developing countries

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[119] WIPO. *Licensing Guide for Developing Countries*, Geneva: WIPO Publications, 1977, paras.1-48.

[120] Ibid.

[121] Ibid, para.47.

find it difficult to make sure that they will be able to further implement and adapt the technology acquired due to restrictive licensing agreements; developing countries find a wall of trade secrets restrictions when attempting to unlock the knowledge acquired by their own citizens.

Why has this situation reached this impasse? Where is the regulation in this area?

2. International technology transfer

The need of developing countries to acquire technology in cost-effective ways results in a clash of interests in the way in which technology transfer will be regulated at national and international level. Developed countries follow a model of strong ownership of technology which places some restrictions upon developing nations. The ownership model relies on the strong intellectual property mechanisms that ensure that this technology remains in the possession of developed countries.

In contrast, developing countries will want to acquire technology in the cheapest possible manner, which is why intellectual property protection is generally weaker in poorer regions. Because of their need, there have been some efforts by developing countries to obtain international protection on subjects relating to technology transfer. The best-known effort is the proposed TOT Code, which is the main international effort to impose a set of self-regulation rules on MNEs to encourage a more equal transfer of technological innovations from rich nations to less developed ones.

2.1 The TOT Code

The history of the International Code of Conduct for Technology Transfer has been a long and tortuous one, and at present, the outlook for its approval is not a promising one.

The UNCTAD was created in 1964 as an organ of the General Assembly of the United Nations to replace the failed International Trade Organisation. Its main purpose has been to provide a forum for the discussion of mechanisms to develop poor countries through trade.[122]

The existence of a technology gap had already been noticed by the United Nations as early as the 1960's. In 1963, the UN Conference on the Application of Science and Technology for the Benefit of the Less Developed Area had already addressed the issue of patents and poor nations. The process that led to the draft TOT Code began when a group of experts met in 1970 to

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[122] Fikentscher, W. *The draft international code of conduct on the transfer of technology: a study in Third World development*, Munich: Max Planck Institute, 1980. p.3

address issues of technology transfer. This led to the creation of several commissions, which culminated in their work on the III General Assembly of UNCTAD in 1972 in Chile, where the need to create an international code on technology transfer was discussed.[123]

A first draft Code was prepared and presented in 1974, which prompted the creation of the Intergovernmental Group of experts on a Code of Conduct on the Transfer of Technology in 1975.[124] A couple of drafts were introduced by developing countries and a group of industrialised nations. In 1976, the IV UNCTAD General Assembly appointed yet another group of experts, which prepared another draft. In 1978, the United Nations Conference on an International Code of Conduct met to negotiate the implementation of the Code, but although there was consensus in certain areas, no agreement resulted on some of the most important aspects. A further meeting of the Conference yielded no results, nor did some discussions during UNCTAD V, which took place in 1979.[125]

In total, the Conference held six sessions in the period between 1978 and 1985. The last session took place on June 5, 1985. A draft was discussed at that meeting, which is the existing text, but no further sessions have been undertaken since then because of the deadlock in the discussion of some of the key issues of the Code.[126]

Much of the problems experienced by the TOT Code can be attributed to the incompatibility of the views held by the countries participating in the discussions. The first and largest group to take part in the talks was the G77, a coalition of less developed countries that was formed in the first UNCTAD conference of 1964.[127] Their goal was to create a legally binding treaty that would cover all kinds of technology transfer and that would contain extensive provisions about dispute resolution.[128] The second group (Group B) was made up of the Western developed nations, which sought the creation of a voluntary code of conduct in which dispute resolution mechanisms would be discussed by the parties.[129] The third negotiating block was made up of

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[123] Ibid. pp.11-13.

[124] Wilner, G. "Transfer of Technology: The UNCTAD Code of Conduct*", Legal problems of codes of conduct for multinational enterprises,* Horn, N. ed; Deventer: Kluwer, 1980, p.178.

[125] Ibid; pp.178-179.

[126] Muchlinski, op cit; p.445.

[127] For an interesting analysis of the G77, see: Williams, M. *Third World Cooperation: The Group of 77 in UNCTAD*, London: Pinter Publishers, 1991, pp.43-52.

[128] Muchlinski, op cit; p.444.

[129] Ibid.

the socialist Eastern Bloc and Mongolia (called Group D), and their proposal was a hybrid between the two other groups.[130]

The existing draft TOT Code consists of nine sections, eight of which are part of the 1985 text. In general, the remaining existing text attempts to deal with present and future national technology transfer regulations. The draft also makes a list of restrictive business practices that are considered illegal, but includes some exceptions. The list of restrictive practices in relation to technology transfer agreements had been highlighted by earlier works from the United Nations Centre on Transnational Corporations (UNCTC). These included agreements that created territorial market restraints, the tying of the agreement to the purchase of other goods, restricting the party from entering into other technology transfer agreements, restrictions on research and development, and restrictions on adaptation or innovation on the technology being acquired.[131] This list is certainly useful as it attempts to curb some of the most common practices that MNEs apply in dealing with developing countries because of their stronger negotiating position.

There are some other important sections dealing with the guarantees and obligations of the parties, and a specific chapter dealing with the preferential treatment given to developing nations when entering into technology transfer agreements. The Code also deals with international technology transfer cooperation agreements.[132]

From the existing draft, one can highlight some of the more positive steps that the text implemented, such as the adoption of several principles that would apply to these types of agreements. The principles tried to bring together some of the opposing views from the Commission, and managed to do so in a satisfactory manner. Perhaps the most important principle is the one that recognises the necessity of fairness in the drafting of technology transfer agreements between the supplier and developing countries. The existing draft reads:

> *Facilitating and increasing the access to technology, particularly for developing countries, under mutually agreed fair and reasonable terms and conditions, are fundamental elements in the process of technology transfer and development.*[133]

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[130] Wilner, op cit; p.179.

[131] United Nations Centre on Transnational Corporations. *Measures strengthening the negotiation capacity of governments in their relations with transnational corporations: technology transfer through transnational corporations*. Technical paper by the UNCTC, New York: United Nations Publications, 1979, paras 32-35.

[132] Fikentscher, op cit; pp.190-191.

[133] UNCTAD. *Draft International Code of Conduct on the Transfer of Technology*, op cit; Ch.. 2.2(vii).

The main points of disagreement stemmed from chapters Four and Nine. Chapter Four dealt with the issue of restrictive business practices. The final drafting of this chapter is the one that has created some of the most heated debate, and a final draft does not exist in the final text. The representatives from the G77 wanted a total ban on restrictive trade practices, which they considered could hinder the economic and technological development of acquiring countries.[134] Group B wanted to apply a ban only to unreasonable practices, such as the ones covered by competition laws of the United States and Europe. Chapter Nine was also never completed and it was considered to be the toughest one to bring to an agreement as it dealt with the applicable law and settlement of disputes.[135] Group B proposed a voluntary system in which the parties could agree on the law that would apply, and they could choose whether to use arbitration to solve their differences. On the other hand, G77 proposed that the law of the receiving country should always apply. They also opposed any type of absolute rule regarding arbitration as the mechanism to solve disputes, as the local law would always be applied first.[136]

These differences appear to be insurmountable, and the talks reached an absolute gridlock. Even well into the 1990s, the UNCTAD Secretary General gathered the opinions of the different groups involved in an attempt to reach an agreement, but apparently he found no possible way out, going as far as stating that "*the conditions do not currently exist to reach full agreement on all outstanding issues in the draft code of conduct*."[137] The issue of the TOT Code appears to have disappeared from the radar at the UNCTAD as it is not even listed in any scheduled upcoming events at this organisation.[138] Unfortunately this avenue appears to lead nowhere.

2.2 Other international attempts

Because of the failure of establishing a text to which all interested parties could agree, the UNCTAD is starting to pursue other avenues to attempt to promote the transfer of technology through other means. At the VIII UNCTAD Conference in Cartagena in 1993, a set of recommendations were provided towards achieving the means to encourage the transfer of technology to developing countries. Because of the commitments set out in this meeting, the

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[134] UNCTAD. *Negotiations on an International Code of Conduct on the Transfer of Technology*. Report by the Secretary General of UNCTAD (TD/CODE TOT/60), New York: United Nations Publications Department, 1995.

[135] Patel, S. J. *From UNCTAD III to the Third Millennium*. International Development Studies Working Papers, September 1999. http://www.stmarys.ca/academic/arts/ids/Papers/Patel.Unctad.doc

[136] Muchlinski, op cit; p.445.

[137] UNCTAD. "A New Partnership for development: The Cartagena Commitment", *Proceedings of the United Nations Conference on Trade and Development*, 8th session, (TD/364/Rev.1), New York: United Nations Publications, 1993, para.173.

[138] A list of future events by UNCTAD can be found on their site, at: http://www.unctad.org/

UNCTAD created the Ad Hoc Working Group on the Interrelationship between Investment and Technology Transfer.[139] Despite being a welcome addition, the group came up with no useful findings in any of its reports. They did agree that there is a strong correlation between technology and development, and that the acquisition of technology is a priority of developing countries; but their suggestions did not add anything new to the debate. Unsurprisingly, the Working Group found that the main means of technology transfer were licensing, direct foreign investment, joint venture agreements, and to a lesser extent, franchising and sub-contracting of work.[140] The group finished by stating a "wait and see" policy, as discussions took place before the then future implementation of an international treaty on the trade aspects of intellectual property under discussion in the GATT process.[141]

Nevertheless, there were some encouraging solutions offered by some members of the Working Group, particularly from developing countries. In particular, these solutions included calls to create fiscal incentives for private enterprises willing to transfer technologies to developing countries and to enhance academic assistance and cooperation;[142] but these solutions did not make it into the final recommendations. UNCTAD seems to have lost the pre-eminence it had earlier on this issue. From reading the group proceedings it is possible to see a continuation of the split between developed and developing nations within the Working Group, and although there is no shortage of diplomatic language, the divisions in regards to the substantive findings are still enormous.

What is more disheartening is that these discrepancies are evident even in other UN fora where technology transfer issues have been discussed. The Commission on Sustainable Development has seen a flare-up in the debate over technology transfer. Countries like China and Cuba have expressed that the developed world should make efforts to provide technology transfer to developing countries, but the response from the representatives from developed nations has not been particularly warm.[143]

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[139] Created through UNCTAD Board decision 398 (XXXVIII).

[140] UNCTAD. *Final report on the Ad Hoc Working Group on the Interrelationship between Investment and Technology Transfer to the Trade and Development Board*, (TD/B/40(2)/17, TD/B/WG.5/12), 1994, paras.8-29.

[141] What later became the 1995 Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS), which will receive further study in the next chapter.

[142] UNCTAD. *Report on the Ad Hoc Working Group on the Interrelationship between Investment and Technology Transfer on its third session*, (TD-B-40(2)-16, TD-B-WG.5-11), 1994, para.8.

[143] Commission on Sustainable Development. *Developed countries must transfer technology to developing states, Commission on Sustainable Development is told*. April 16, 1998. Press Release ENV/DEV/347. http://www.un.org/search

Despite the failure in UNCTAD, other signs are more encouraging as technology transfer has been mentioned in some international agreements. Of particular mention at this stage is the 1992 Convention on Biological Diversity (CBD),[144] part of the Earth Summit dealing with sustainable development in Rio de Janeiro. The CBD contains an entire article mentioning technology transfer, encouraging the signatory states to foster the transfer of technology between each other in the area of biodiversity. Article 16.1 reads:

> *"Each Contracting Party, recognizing that technology includes biotechnology, and that both access to and transfer of technology among Contracting Parties are essential elements for the attainment of the objectives of this Convention, undertakes subject to the provisions of this Article to provide and/or facilitate access for and transfer to other Contracting Parties of technologies that are relevant to the conservation and sustainable use of biological diversity or make use of genetic resources and do not cause significant damage to the environment."*

Despite this laudable opening paragraph, the rest of the article fizzles out, as it does not offer specific mechanisms in which the transfer of technology will be achieved. Although the article invites developed countries to treat developing countries with favourable status, and encourages the implementation of legislation that allows access to biological and genetic materials, the CBD lacks teeth when it comes to enforcing lack of compliance. Nevertheless, the provisions in the CBD must be applauded.

WIPO has also expressed some interest in trying to create some guidelines in the area of international licensing,[145] but other than those efforts and a joint workshop on the subject about technology transfer to developing countries and a few papers, the topic had not generated enough interest in the organisation.[146]

3. Regional technology transfer attempts

There is a void in the international system of technology transfer due to the failure of to implement the draft TOT Code, and also caused by the failure by the international community to create a durable and enforceable instrument for the regulation and encouragement of technology transfer. The problems created by this void are obvious. In a competitive business environment, developing countries are looking to attract foreign investment in any possible

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[144] Full text of the convention can be found here: http://www.biodiv.org/convention/articles.asp

[145] A future WIPO *Guide on the Licensing of Copyright and Related Rights* is under development.

[146] Raizada, B. "Intellectual Property, Technology Transfer and Policy Framework - Experience of India in the Pharmaceutical Sector", *WIPO national seminar on industrial property and the PCT*, (WIPO/PCT/MRU/02/10), Mauritius, July 2002.

way, which gives technology owners a better bargaining position when negotiating technology transfer agreements. Given the relative international inactivity in this area, it has to be assumed that other options have to be explored.

3.1 Regional agreements

Still within the international arena, the next best option for the implementation of some technology transfer regulation is by means of regional treaties on the subject. The forerunner in this respect is the Andean Common Market (ANCOM), formed by Bolivia, Colombia, Ecuador, Peru, and Venezuela. The Cartagena Agreement,[147] which created this trade partnership, opened a united negotiating front by this group of neighbouring countries. The original Pact was originated in 1971, and was reformed later in 1987, but the latest version still provides for a united negotiating group. In Article 65.d of the Agreement, the member states maintain that they will undertake "*joint negotiations with enterprises and international government agencies to gain external resources or transference of technology.*"[148] This facilitated a united front in any negotiation regarding technology transfer agreements, providing the member states of ANCOM with a better bargaining position.

Unfortunately, the provisions in the original Agreement have been eroded because of external economic pressure.[149] After a summit of the presidents of the member states in 1990, ANCOM found that some specific changes were required to foster international investment and to increase economic openness and market liberalisation. After that meeting, the Cartagena Agreement Commission passed resolution number 291, which makes some specific changes to the existing interpretation of the Agreement in order to maintain competitiveness in the area. Article 10 of the resolution reads*: "In the resolution of conflicts that arise from foreign investment or transfer of technology, the member states will apply their own legislation.*"[150] It is obvious that the wording has created a material deviation from what is stated in the Cartagena Agreement, foregoing the requirement to present a united negotiating front and making it possible for countries to negotiate unilaterally with technology owners. It is difficult to maintain

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[147] Comunidad Andina. *Pacto de Cartagena*. March 10, 1996. Translated by the author. http://www.comunidadandina.org/ACUERDO.HTM

[148] *Pacto de Cartagena*, Art. 65.

[149] Muchlinski, op cit; p.447.

[150] Cartagena Agreement Comisión. *Resolución 291*. March 22, 1991, Art. 10. Translated by the author. http://comunidad.derecho.org/pantin/decision291.html

that the spirit of the Cartagena Agreement still exists, as the technology transfer provisions included in the agreement have been watered down.

Another regional effort on regulating technology transfer can be found with the proposed creation of the Free Trade Area of the Americas (FTAA). During the 1996 Summit of the Americas that took place in Bolivia, the participating states voted for Resolution 33, in which the signing states promised to undertake efforts for the development of technology transfer initiatives. The United States and Canada were among the signatory countries, which lends credibility and strength to this promise.[151] The 1998 and 2001 summits continued the specific commitments towards the development of a hemispheric policy in specific technological areas. The 2001 Quebec summit in particular produced commitments in encouraging technology transfer in the areas of disaster management, ecologically sound technologies, and education.[152] The working draft of the FTAA, resulting from these summits, takes these proposals and includes them in the intellectual property regime that is an essential part of the eventual Agreement.[153] Unsurprisingly, there is still considerable emphasis on the protection of intellectual property in the proposed text. However, some of the proposals regarding technology transfer appear to be positive, although the exact wording in this respect is still not finalised. Article 9 stipulates that each party will attempt to stimulate technology transfer in the area as an incentive to competitiveness in the international market by several means. The proposed text also allows member countries to provide rules that may prohibit restrictive contractual practices,[154] but it does not specify what those practices may be. The article also relies heavily on economic incentives, which responds mainly to the economic interests of the United States in the area.

It is still too early to ascertain if these provisions will serve to encourage the transfer of technology, although the naming of specific sectors of technical cooperation must be taken as a very positive step towards this end. There is a clear possibility that the good intentions expressed in text will not be translated into action, as was the case with ANCOM.

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[151] Summit of the Americas on Sustainable Development. *Cumbre de las Americas: Declaración y Plan de Acción*, Chapter IV.2, Resolution 33, December 8, 1996. http://environment.harvard.edu/cumbre/eng/ag-s0017.htm

[152] Summit of the Americas. *Quebec City Summit: Plan of action*, 2001. http://www.summit-americas.org/Documents%20for%20Quebec%20City%20Summit/planofaction-template-eng.htm

[153] Second Draft Agreement of the Free Trade Area of the Americas. Chapter on Intellectual Property, Art. 9.

[154] Draft FTAA, Art. 9.4.

The option of relying on regional trade agreements may be a plausible solution, but it is still not clear how effective they can be in providing a proper legal framework to assist developing countries in negotiating technology transfer agreements. Nevertheless, a specific legal framework requires further exploration so as to present a united front against economic powers; but this path may be criticised on the ground that the implementation of technology transfer rules may discourage investment. A broad agreement or code of conduct is still the most desirable solution, but regional solutions may have to do for the time being.

3.2 European technology transfer block exemptions

Although the European Union does not have in place any technology transfer mechanisms at a wider level, there are some interesting technology transfer regulations that apply specifically to the field of competition law. The EU has a comprehensive system of rules that regulate the market behaviour of undertakings, so as to enhance competition within a market.[155] Articles 85 and 86 of the European Community Treaty of Rome[156] regulate the competition law system in areas such as market dominance, horizontal agreements, monopolies, oligopolies, and many other anti-competitive practices. These rules are very strict and have the desired goal of achieving a system of workable competition.[157] The European system of competition law is a subject of intense interest on the part of enterprises operating in the EU because of the strict application of the competition rules. Multinational corporations have been fined considerable amounts of money when they have been discovered to be engaged in anti-competitive practices.[158] For example, new legislation in the UK will even impose jail sentences and disqualification penalties for company directors found guilty of dishonest actions leading to anti-competitive practices.[159]

Within this very strong legal framework, Article 85.3 of the Treaty of Rome specifies that the anti-competitive practices listed in Article 85.1 – which includes actions like price fixing,

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[155] Competition, in an economic context, can be referred to as "…*the actions of two or more rivals in pursuit of the same objective. In the context of markets, the specific objective is either selling goods to buyers or alternatively buying goods from sellers*", See: "competition", *AmosWorld Economic Glossary*. http://amos.bus.okstate.edu/glossary

[156] Formerly Arts. 81 and 82, renumbered by the Treaty of Amsterdam.

[157] For more on these concepts see: Whish, R. *Competition Law*, 3rd edition, London: Butterworths, 1993; and Goyder, *EC Competition Law*, op cit.

[158] A famous case took place in 2001, when eight companies were fined a record £529.5m for fixing prices of vitamins in what was considered to be a vitamins cartel. *Hoffman-La Roche + BASF + Rhône-Poulenc / PO*. COMP/37.512. A report of the case can be found here: http://europa.eu.int/rapid/start/cgi/guesten.ksh?p_action.gettxt=gt&doc=IP/01/1625|0|RAPID&lg=EN

[159] This is done in the recently passed Enterprise Act 2002. More details about the act can be found here: http://www.competition-commission.org.uk/inquiries/enterprisebill.htm

entering into anti-competitive agreements with other undertakings, and others – will be exempted from enforcement in agreements that contribute "*to improving the production or distribution of goods or to promoting technical or economic progress*".[160] The effect of this exemption is that undertakings will be able to notify the European Commission that their agreement falls in this category and should not be considered anti-competitive. Further to this exception, the Commission created a set of exemptions for technology transfer agreements within the European Union, with the Block Exemption Regulation 240/96/EC.[161] This regulation was the result of bringing together two existing block exemptions for know-how agreements and intellectual property licences,[162] which allowed undertakings involved in one of the listed agreements to forego the notification procedure enacted by Article 85.3.

The subject matter of the block exemptions are technology transfer agreements in the shape of patents, but the Regulation also covers know-how licensing agreements, and mixed patent and license agreements.[163] The exemptions are under revision, however, and there is a serious proposal to include licensing of trademarks, copyright and design rights as well; this is because the Commission has found that these issues generate a large amount of exemption applications.[164]

The creation of these exemptions for technology transfer agreements has the general objective of ensuring a broad utilisation of innovative technology by allowing an owner to exploit their innovation instead of not making use of it.[165] In other words, without these exemptions, it is assumed that some creators or owners may not exploit their innovations in a particular market if unable to impose certain restrictions on the use in that other market. The other stated goal of these exemptions is to increase legal certainty and to decrease the number of exception applications that the Commission would otherwise receive.[166] But perhaps the most important effect of the existence of these block exemptions is that there is a marked intention by the

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[160] Treaty of Rome, Art. 85.3.

[161] Commission Regulation 240/96/EC on the application of Article 85(3) of the EC Treaty to certain categories of technology transfer agreements, OJ 1996. L 31/2.

[162] Regulations 23/49/EC and 556/89/EC.

[163] Commission Regulation 240/96/EC, Art. 1.

[164] Chahil, R. "The road ahead – The European Commission's view of the reform of the Technology Transfer Exemption (240/96)", *Computer Law & Security Report*, Vol.18(5), 2002, pp.318-321.

[165] Powell, M. "Technology Transfer: The European Commission's Technology Transfer Regulation", *Computer Law & Security Report*, Vol.13(2), 1997, pp.126-131.

[166] Alexiadis, P. and Ferchiche, L. "European Community: Competition", *E.I.P.R.* 24(5), 2002, pp.75-77.

European Commission to make technology transfer licensing agreements more appealing for MNEs. By giving several exemptions in the very strict area of competition regulation, the Commission is taking great steps to create an environment where firms will feel more comfortable signing licensing agreements. According to Korah, the Commission "*has recognized that competition stimulates innovation and innovation stimulates competition.*"[167]

Although the underlying rationale behind the block exemptions is to foster technology transfer within the EU, the rules would seem to apply as well to licensing agreements with undertakings or governments outside of the European Community. This should be assumed as the Regulations make no mention whatsoever in this respect. This has the beneficial effect that corporations may be more likely to transfer technology to developing nations without fear of breaking competition rules.

Nevertheless, there is an unexpected problem created for developing countries by the block exemption system. By allowing European firms to become exempt from the oversight of competition law, these undertakings could easily be involved in what would otherwise be considered anti-competitive practices, as there is a danger that companies will have an open field to negotiate licensing agreements that will contain terms that are damaging to developing countries. As stated above, the TOT Code attempted to curb the use of restrictive practices, some of which were also in contravention of competition law. For example, agreements that contain restrictions on the acquisition of competing or complementary technology would normally be considered anti-competitive practices,[168] but these types of agreements are to be included within the technology transfer block exemptions. However, Kinsella points out that if a restrictive agreement from a European undertaking takes place, this agreement will still be subject to the competition regulations enforced within the EU.[169] This of course begs the question of why there are block exemptions in the first place if such actions are still subject to competition regulations.

Despite these worries, the existence of these exemptions must be considered a positive instrument for less developed nations. There appears to be a certain relationship between competition law, licensing and the innovation process.[170] Regional regulations like the

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[167] Korah, V. *Technology Transfer Agreements and the EC Competition Rules*, Oxford: Oxford University Press, 1996, p.10.

[168] Microsoft is being accused of doing precisely that. For more on this case, see: Levy, N and Dolmans, M. "EC Commission v Microsoft: win, lose or tie?" *Commercial Lawyer* 51, 2002, pp.36-37.

[169] Kinsella, S. *EU Technology Licensing*, London: Paladin Law Publishing, 1999, pp.108.

[170] OECD. *Competition Policy and Intellectual Property Rights*. OECD policy paper, 1989.

European block exemptions are indicative of the fact that there are other avenues to be explored in the area of technology transfer regulation.

4. National technology transfer regulation

It is not yet clear just how efficient the mentioned regional agreements will be in fostering technology transfer from developed countries and in defending the interest of less developed nations. The implementation of national legislation may present another way to regulate technology transfer. Although many developing countries have such laws in place, it has been pointed out that many of these laws are inoperative, or are being repealed.[171]

Nigeria passed a law in 1979 to attempt to centralise the process of technology acquisition negotiations, with other legislation regulating this area in the subject of petroleum technology. However, this law has been widely ignored by multinationals and local enterprises.[172] Other attempts at regulating the transfer of technology at national level have been repealed in Brazil after liberalisation efforts hit the country in the early 1990s. A similar situation operates in India, with India's national technology transfer legislation.[173]

All of these failed examples of technology transfer legislations may be attributed to the fact that attracting foreign investment is becoming one of the main goals for developing nations, and the competition to achieve this goal is fierce. One of the ways to gain a competitive advantage is to present investors with a dynamic country with as few bureaucratic and legal restrictions as possible, as well as providing extensive tax breaks.[174] If a country becomes too expensive, or offers restrictive laws and bureaucratic obstacles, the technology owner can just move on and look for a better place to do business. If presented with a place that offers technology transfer regulation and one that does not, it would be fair to assume that all things being equal the MNE will choose the later.

Despite the doubtful track record of national technology transfer legislation, China offers an example of a developing country that has been successful in implementing a legal regulatory regime in this area. In 1985, China implemented a technology transfer regulatory scheme in the

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[171] Muchlinski, op cit; pp.447-448.

[172] Ibid.

[173] Ibid.

[174] For more on this issue, see: Noorbakhsh, F; Paloni, A. and Youssef, A. "Human Capital and FDI Inflows to Developing Countries: New Empirical Evidence", *World Development* 29(9) September 2001, pp. 1593-1610.

shape of the Administration of Technology Import Contracts,[175] which established a strict governmental control over all technology transfer agreements made effective in the People's Republic of China. These regulations applied to every licensing of patent, industrial design or other intellectual property rights, and also covered know-how agreements and technical service contracts.[176] Under this scheme, every contract dealing with these subjects had to be approved by the Administration, which was required by the legislation to make sure that the contract would provide enough time for the recipient of the technology to be able to assimilate it. The regulation also established a list of restrictive terms that would be immediately removed from a contract. These included – amongst others – forcing the recipient to purchase other unrelated goods in exchange for the technology; the restriction of sales channels; and restrictions to the further use of the technology after the agreement had ceased.[177] A set of implementation rules for this regime were later approved in 1987.[178]

The existing Chinese regulations have undergone a recent amendment to make them more open and friendly to direct investors in technology. This was achieved with the new Technology Import and Export Administrative Regulations.[179] As the title describes, these new rules regulate not only technology imports, but also exports. There is still a requirement from the contracting parties in a technology transfer agreement to obtain permission for the implementation of the contract in the People's Republic of China, but there are some changes that eliminate some of the strictest rules from the previous regulations. The main change is that technology owners will not be required to allow recipients to use the acquired technology after the conclusion of the contract, and the prescribed minimum term for the contracts will also be abolished. There are also some administrative changes directed towards making the application process much easier.[180]

Although it could be argued that both the new and old sets of regulations were stricter than any other unilateral effort at a national level in the developing world, there cannot be any doubt that China has enough market power to be able to pose a comprehensive legislative technology

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[175] Passed by the Chinese State Council on May 24, 1985.

[176] Regulations on the Administration of Technology Import Contracts, Art. 2.

[177] Ibid, Art. 9.

[178] These are the Implementing Rules for the Regulations on Administration of Technology Import Contracts, approved by the State Council on December 30, 1987.

[179] Passed in December 2001.

[180] Chan, J. "China's new regulations on technology imports and exports", *International Trade & Law Regulation*, 8(3), 2002, pp.97-103.

transfer regime because of the sheer size of its market. The scrapping of existing national technology regulations in other countries can serve as evidence that those countries feared that these were stifling foreign investment. However, China is too big a market to be so easily dismissed by multinational corporations. It is entirely possible that most undertakings will tolerate China's technology transfer requirements, in return for the opportunity to enter the Chinese market; an LDC could not hope to have a similar legislation and place and remain competitive. The rapid advancement in many technological areas during the 1990s would serve as evidence that the Chinese technology transfer regulations did not alienate potential investors.[181] Further evidence of this is that China is the top developing country recipient of foreign direct investment, and it is thought that this year it may pass the United States as the top FDI recipient in the world.[182]

The Chinese model could then offer a viable regulatory path to some other larger developing nations. It is curious that other large developing markets like Brazil and India have not taken advantage of the potential use of their market size gives to enact legislation that will grant them an advantageous negotiating position against the economic power of large technology owners. Nevertheless, this does not fully answer the problem of diminished negotiating power in technology transfer agreements for less developed nations with smaller markets. There can be little doubt that a smaller country that attempted to impose the Chinese model would simply be bypassed by foreign investors. This leaves fewer possibilities open in this field for least developed nations.

5. Fostering direct investment

From reading the last sections it has become evident that the legislative attempts to provide developing countries with a workable set of rules to create incentives and protect them from entering into disadvantageous technology transfer agreements have not been fruitful, and that many poor nations still find themselves with problems when attempting to acquire technology from developed nations. It is possible to continue attempts to obtain international consensus to create an international framework for the regulation of this important area for development, but at the moment there is no compromise in just how to do this. Would it be possible to attempt some other options beyond the ones discussed already?

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[181] To see more about specific advancements in the area of telecommunications, see: Shen, X. *The Chinese road to high technology: a study of telecommunications switching technology in the economic transition*, New York: St. Martin's Press, 1999.

[182] UNCTAD. *World Investment Report 2002*. http://r0.unctad.org/wir/contents/wir02content.en.htm

It is unlikely that technology transfer regimes will change in the near future. This leaves developing countries in the position of having to continue to acquire technology through the traditional channels of licensing, know-how agreements and direct investment, and also having to work without a viable international regulation regime.

5.1 Why foreign investment?

Technology owners have made sure that any new option for technology transfer will have to take into consideration the fact that intellectual property must be at the centre of any operation between technology industries and the developing world. Talking about the requirements for technology cooperation with the developing world, the International Chamber of Commerce (ICC) has stated that:

> *"The protection of patents and property rights of the developer is also essential to ensure that funding is available for yet further technological developments. A company will rarely share its technological know-how if it loses control of that know-how as a direct result. Governments should examine whether their existing legal and fiscal structures act as barriers to discouraging technological cooperation and investment, and where this is the case they should enact measures to replace them with enabling fiscal and other framework conditions."*[183]

One of the main methods of ensuring this control over the technology is by the granting of licences of intellectual property rights to enterprises and/or governments in the receiving territory. Licensing of technology is a big business for developed nations, being one of the most important export industries for some countries. As stated by Ryan:

> *"U.S. multinational manufacturing enterprises increasingly transfer intellectual property internationally through the industrial processes that they sell abroad. Exports, as measured by royalties and licensing fees, amounted to about U.S.$27 billion in 1995, while imports amounted to only U.S.$6.3 billion. At least U.S.$20 billion of the exports are transactions between U.S. firms and their foreign affiliates."*[184]

Licensing is not only a big industry, but also has been steadily on the increase. In 1947, intellectual property licensing did not even reach 10% of the total exports in the United States. By 1987 this figure had reached 37% of the total exports, and it is calculated that the figure

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[183] International Chamber of Commerce. *Technology Cooperation and Assessment*. Policy statement by the ICC to the UN Commission on Sustainable Development, 30 January 1998. http://www.iccwbo.org/home/statements_rules/statements/1998/final_technology.asp

[184] Ryan, M.P. *Knowledge Diplomacy: Global Competition and the Politics of Intellectual Property*, Washington DC: Brookings Institution Press, 1998.

might be close to 50% at present.[185] It is not difficult to foresee that this figure will continue to increase as the economy in developed countries moves from manufacturing into services. The economic power in these countries is retained by the acquisition and ownership of knowledge, and the commodification of information.[186] For these reasons, there is immense pressure by developed countries to increase international protection.

Under this scheme, licensing has become an attractive option for intellectual property owners because it implies the minimum investment for them. If some technology is owned and it is desired by governments and undertakings in developing countries, all they have to do is grant a licence and the technology will go directly to the recipient, who will have to make sure that it is used in the prescribed manner. But if licensing is appealing for technology owners, is it similarly appealing for the recipient developing countries? The answer is no.

There is a large deficit between technology imports and exports of technology in less developed nations. In 1998, the US received a net surplus of more than $23 billion USD from its intellectual property related exports.[187] According to figures by the International Centre for Trade and Sustainable Development (ICTSD), there are just a few countries that enjoy a trade surplus of intellectual property materials. The UK has a surplus that just exceeds $1 billion USD, and the US has a staggering surplus of more than $20 billion USD. In contrast, developing countries have a large deficit in this area, which means that they import large amounts of intellectual property works.[188] This imbalance is caused to large extent by the licensing inequity, as developing countries have to purchase technology through licences as the easiest means of acquisition. But the restrictions upon these licences may be too onerous, and without an international regime regulating this area, they may even be abusive in some ways. There is also the great problem that the recipient may not have the infrastructure to be able to implement a licensed technology, forcing poor nations to license only low-level technology that they already can assimilate in some way.

The best solution for developing countries may be to attract direct foreign investment of high-technology industries. This may seem a like a controversial position at first because there is

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[185] Gikkas, N. "International Licensing of Intellectual Property: The Promise and the Peril", *Journal of Technology Law & Policy*, Vol.1, Issue 1, Spring 1996. http://journal.law.ufl.edu/~techlaw/1/gikkas.html

[186] For more on this see: Drahos and Braithwaite, *Information Feudalism: Who owns the Knowledge Economy?* op cit; p.39.

[187] Oxfam. *Intellectual Property and the Knowledge Gap,* December 2001. http://www.oxfam.org.uk/policy/papers/knowledge/knowledge.html

[188] UNCTAD and ICTSD. *Intellectual Property Rights and Development*. Draft Policy Paper, 2001. http://www.ictsd.org/issarea/iprs-sd/docs/PolicyPaperIPRs.pdf

prevalent assumption that technology owners will be less likely to invest in countries where there is not adequate intellectual property protection.[189] Nevertheless, the evidence that points towards the discouragement of investment in countries with weaker protection is not as strong as some would assume. Maskus has found evidence that several developing countries with strong intellectual property protection have not been attracting as much foreign investment as countries like Brazil, India and China, which have had until recently weaker intellectual property protection regimes.[190]

Assuming that direct investment will take place even in countries with weak intellectual property protection, the question still remains as to whether or not this is the desired route for encouraging technology transfer to developing countries. To answer this question, it must be proven that direct investment will produce beneficial results in recipient nations, namely that the technology that is brought in by the owner will somehow be assimilated by the beneficiary. There is some evidence that this is the case. For example, a corporation that creates a new subsidiary in a developing country may still want to patent their technology in the country to make sure that it is protected; by disclosing the invention this will open the opportunity for other firms in the country to make use of the technology once the patent has expired.[191] Some other studies have found that foreign direct investment in developing countries does indeed produce technological overflows that will increase productivity in other sectors of the economy, particularly in industries that rely heavily on research and development.[192]

Nevertheless, there are also problems with this scheme. Another study has found that strong intellectual property rights in a developing country may even prevent technology transfer because the receiving country cannot make use of the innovations by virtue of restrictions imposed by stricter legal provisions.[193] It is a common practice of technology owners to impose severe non-disclosure agreements upon their employees in developing countries in an attempt to

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[189] For some research in this area see: Mansfield, E. "Unauthorized Use of Intellectual Property: Effects on Investment, Technology Transfer, and Innovation," *Global Dimensions of Intellectual Property Rights in Science and Technology*, Wallerstein, M.B; Mogee, M. E. and Schoen, R. A. eds; Washington DC: National Academy Press, 1993, pp.107-145.

[190] Maskus, K. *Intellectual Property Rights and Foreign Direct Investment*. Centre for International Economic Studies Policy Paper No. 22, 2000. http://www.adelaide.edu.au/cies/0022.pdf

[191] Mansfield, E. "How Rapidly Does Industrial Technology Leak Out?" *Journal of Industrial Economics*, Vol.34, 1985, pp.217-223.

[192] Kinoshita, Y. *R&D and Technology Spillovers via FDI: Innovation and Absorptive Capacity*. Davidson Institute Working Paper Number 349a, April 2001. http://eres.bus.umich.edu/docs/workpap-dav/wp349a.pdf

[193] Glass. A. J. and Saggi, K. "Intellectual property rights and foreign direct investment: implications for economic growth", *Journal of International Economics*, 56(1), 2002, pp.131-153.

make sure that the technology remains proprietary, particularly if the technology has not been patented and is protected by trade secrets. This would imply that most of the technology will remain in the ownership of the company. An excellent paper charting the literature in the subject of FDI and investment points out that although the evidence seems to be contradictory, it would seem that technology spill-over from one direct investor to a developing country are greater in countries with a much smaller technology gap.[194] This is generally attributed to the fact that countries with less technological capability will be less likely to adopt and assimilate the technology because they lack the local know-how to do it.

There are still indirect benefits of employment and education, but the fact remains that multinationals will continue to own the technology and developing nations will obtain only indirect benefits. However, even these indirect consequences may have long term effects for the developing nation as the technology owner will have to train staff to be able to operate technology. There seems to be enough evidence that at least some technology will remain in the country even if the undertaking leaves.

5.2 Some direct investment experiences

Having seen that the best option at the moment is for developing countries to attract direct investment, some successful examples of where this has been achieved may point the way for other nations to follow.

One of the most noteworthy experiences in attracting high-technology investors into a developing nation is the creation of so-called technology parks or science parks, which have proven to be successful throughout Europe.[195] According to the British Council:

> *"A science park consists of a supporting infrastructure for the establishment and development of knowledge-based companies based in a location formally linked (and usually physically close) to a centre of technological excellence, usually a university. It normally incorporates business management and other services and a technology link to the centre of technological excellence."*[196]

The implementation of these parks is usually accompanied by tax incentives, government grants or subsidies, and the setting up of networks with nearby higher education institutions. These

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[194] Blomström, M and Kokko, A. *The Economics of Foreign Direct Investment Incentives*, National Bureau of Economic Research Papers, Working Paper 9489, 2003, pp13-14.

[195] Löfsten, H. and Lindelöf, P. "Science Parks and the growth of new technology-based firms: academic-industry links, innovation and markets", *Research Policy* 31, 2002, pp.859–876.

[196] British Council, *Science Parks*. http://www.britishcouncil.org/science/science/pubs/briefsht/science_parks/parks.htm

parks are usually considered excellent providers of technology transfer opportunities.[197] The advantages for developing countries in adopting this road are evident. When moving into a science park, technology owners will have to hire and train the local labour force, which implies long-term benefits. It is difficult to assess the exact impact of high-technology firms moving into science parks in a developing country, but some preliminary evidence supports the statement that the short-term benefits are impressive.[198] It is surely undeniable that the mere fact of having a high concentration of technological enterprises has to be beneficial to an underdeveloped economy.

Costa Rica is a developing country that has been successfully applying the science park model. By setting up tax-free science parks around the country, the amount of money generated by direct foreign investment surpassed $1 billion USD during 1998, of which more than a third was made up of investment in science parks.[199] In that same year, Costa Rica had 219 foreign high technology companies located in these science parks, which employed 27,200 employees directly.[200] Despite these figures, direct foreign investment did suffer a decrease after 2001, but this was due in large part to a global economic downturn.

Science parks in Costa Rica have created a specialised workforce that can respond to the demanding needs of modern markets. In many instances, multinational corporations have understood that they have a lot to gain from providing help to the economies and higher education institutions of the developing countries in which they are based. For example, the giant multinational Intel has established a large manufacturing centre in Costa Rica that employs 3000 people. As part of the decision to invest directly in the Costa Rican economy, Intel has signed a co-operation agreement with the University of Costa Rica to improve its engineering courses and provide millions of dollars in equipment and training.[201] This is a direct benefit to the future of the country, as the knowledge will remain even if the owners leave.

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[197] Rowe, D. "The role of Science Parks in innovation and technology transfer: Summary", *The role of Science Parks in innovation and technology transfer*, Sunman, H. ed; Sutton: UK Science Park Association, 1989. p.115

[198] See both: Kihlgren, A. "Promotion of innovation activity in Russia through the creation of science parks: the case of St. Petersburg (1992–1998)", *Technovation* 23, 2003, pp.65–76; and Lee, W.H. and Yang, W.T. "The cradle of Taiwan high technology industry development: Hsinchu Science Park (HSP)", *Technovation,* Vol.20, 2000, pp.55–59.

[199] Ministerio de Comercio Exterior. *Flujos de inversión extranjera directa en Costa Rica 1997-2002*. V Informe del Grupo Interinstitucional, 2002. http://www.comex.go.cr/estadisticas/inversion/V_Informe_IED.pdf

[200] PROCOMER. *Estadísticas de exportación de zonas francas*, Abril 14, 1999. http://www.procomer.com/espanol/9151.htm

[201] Delgado, E. "Más fuerza a educación técnica: Entrevista con presidente de Intel", *La Nación Digital*, August 12, 1998. http://www.nacion.co.cr/ln_ee/1998/agosto/12/economia1.html

It is not only developing countries that can assist in motivating direct investment. Developed nations can also help poor countries by introducing, through legislation and other means, incentives for companies that invest in these nations. This form of unilateral effort may be the way of the future, evidenced by the fact that some European countries are starting to create an encouraging environment for the transfer of technology from their local industries to developing countries. In the UK, the Department of Trade and Industry has established the Technology Partnership Initiative (TPI),[202] a project that encourages UK companies to transfer ecologically-sound technologies overseas. Many other developed nations are taking some official steps in this direction,[203] a trend that must be welcomed and encouraged as it may foster the spirit of cooperation required in this area.

Bilateral agreements between countries could pose another incentive. There is a recent agreement signed between the European Software Institute and China, in which future joint ventures are regulated. In their recommendations, the involved parties promise to sign technology transfer agreements to be able to obtain their goals on the joint venture.[204] Although positive, the question with these sorts of agreements still remains, as these bilateral agreements may contain restrictive terms for the receiving country. There are several draft licensing contracts available to developing countries which could help them in entering into such agreements. A model contract by WIPO that dates back to 1977 still contains several useful clauses that attempt to ensure that developing countries will not be short-changed when dealing with a powerful technology owner.[205]

Although some of these options may seem viable, the problem of technology transfer agreements still remains. There cannot be a perfect substitute for the preferred solution, the enactment of some sort of international mechanism that will set rules against restrictive practices in technology contracts and licences. The problem of the acquisition of technology by poor nations is by no means easy to solve, and the systems of technology transfer described have one big disadvantage – technology must still be purchased in one way or another. Nevertheless, attempting to have a technology transfer system that will at least be favourable to

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[202] http://www.dti.gov.uk/tpi/

[203] OECD Secretariat. Technology *Transfer, Development and Capacity Development*. http://r0.unctad.org/stdev/discussion/tt5.html

[204] European Software Institute. *EU-CHIP Agreement*. 1996, Chapter VII. http://www.esi.es/EU-CHIP/Contents/Misc/Contracts/1c7.html

[205] WIPO, op cit; pp.41-140.

the needs of developing nations should be at the top of the agenda for discussions on this subject. It is surprising that this very important subject has been neglected so far in the nascent debate about intellectual property rights and less developed nations. It cannot be stressed enough that this is an area of vital importance to developing countries. If things stay as they are now, economic power will be the determining factor in the negotiation of technology transfer agreements between the developed and less developed countries.

Chapter 3. Owning ideas: The intellectual property regime

> *"That ideas should freely spread from one to another over the globe, for the moral and mutual instruction of man, and the improvement of his conditions, seems to have been peculiarly and benevolently designed by nature, when she made them, like fire, expansible over all space, without lessening their density in any point, and like the air in which we breathe, move, and have our physical being, incapable of confinement of exclusive appropriation. Inventions then cannot, in nature, be a subject of property."*
> ***Thomas Jefferson***

The last two chapters have helped to establish the importance of technology for the issue of development, but in doing so something else has become clear. Developing countries rely heavily in imitation and the acquisition of technology from those who have already developed it, particularly because high-technology requires heavy investment in research and development, and most poor nations, particularly LDCs, do not have the resources to undertake such research. The acquisition of technology by developing countries is also a problem because developing countries find themselves in a disadvantageous position when negotiating technology transfer agreements because of the lack of an international standard to protect and assist developing countries in this respect.

The issue at the heart of technological innovation since the last half of the 20th century is one of ownership through intellectual property. This chapter will take a closer look at the international system of protection of ideas, its history, the justifications behind it, and it will also explore whether the system can be replaced for another one.

1. Owning ideas: The development of intellectual property

1.1 Property vs. intellectual property

Before providing more details about intellectual property, it is important to make some distinctions between intellectual property and tangible property, as there is obviously a relationship between both. This is important to the present study because property per se is not discussed in the wider theme of technology ownership and less developed countries. After all, people in the developing world can easily acquire physical technology if they have the required monetary resources. For example, people in the Sudan can purchase a computer, a tractor or a new type of seed. The act of purchase would warrant the buyer with ownership over that particular piece of technology, they would own the physical computer, tractor or seed.

Intellectual property is important because it deals with something more important: the acquisition of the knowledge to produce that technology. For example, if the process to produce a specific piece of computing equipment is owned by a patent, then the people in the Sudan will not be able to produce that computer by themselves (granting that the patent is registered there), as the knowledge necessary to manufacture it is owned. The people would have to acquire this knowledge to create new computers.

Another reason why it is important to study both systems is that there are people who equate the success of property with that of intellectual property. Famous objectivist Ayn Rand goes so far as to suggest that property depends almost solely on intellectual property. She commented that "*patents are the heart and core of property rights, and once they are destroyed, the destruction of all other property rights will follow automatically, as a brief postscript*."[206] This view may be extreme, but serves to emphasise that in the minds of some people, the entire system of property is indistinguishable whether one speaks of material property and its intellectual cousin. One needs only to read anything written by copyright owner lobbies such as the Business Software Alliance (BSA) to read appeals *ad populum* about how copyright infringement is the same as stealing a car.[207]

Historically, modern property arises from Ancient Rome, where the system of *dominium* or *proprietas* (literally ownership) was first established. In this system, the owner of a thing had a property right recognised by the State. The Roman system recognised that the possessor of a thing would not always be the proprietary, but ownership was assumed. Restrictions on ownership were also common.[208] Property was further developed with the English medieval Feudal system, in which property was awarded by the King to one of his trustees, and the owner of the land received payment by the possessors of the land as a means of usage fee.[209]

These early stages apply only to the existence of real property. However, many authors believe that the modern property system of tangibles and intangibles originates from modern Western capitalism in its earlier forms, in particular, the mercantilist and proprietary system of Renaissance Venice during the thirteenth century. Many historical factors colluded in Venice to

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[206] Rand, A. as quoted by: Hettinger, E. C. "Justifying Intellectual Property", *Philosophy and Public Affairs*, Vol.18, No.1, 1989, p.31.

[207] For a colourful description, and thorough rebuttal of this line of argument, see: Drahos, P. and Braithwaite, J. *Information Feudalism: Who owns the Knowledge Economy?* Op cit, pp.25-29.

[208] Cribbet, J. E. *Property law*, 3rd edition, New York: Foundation Press, 1989.

[209] Ibid.

help the development of modern capitalism: Venice was the mercantile centre in the Mediterranean, and there was an accumulation of wealth and the exploitation of wage labour, two of the most marked features of capitalism.[210] Also with the rise of capitalism came the modern characteristic of understanding property as an individual right, instead of a more collective system, which was the standard left by the Roman and Feudal systems.

Modern property owes a lot to these systems, but the regime as we know it stems mostly from the early modern period, and the works of philosophers and other thinkers, because theoretically, it has received a more complex treatment in the hands of philosophers. One of the earliest proponents in this area was the philosopher John Locke, who was the main proponent of property as a basic natural right of the individual:

> *"Every Man has a Property in his own Person. This No Body has any Right to but himself. The Labour of his Body, and the Work of his Hands, we may say, are properly his. Whatsoever then he removes out of the State that Nature hath provided, and left it in, he hath mixed his Labour with, and joyned to it something that is his own, and thereby makes it his Property"*[211]

Some of the original theoretical problems that arise from the study of property are centred upon its very existence. How is property acquired in the first place? Locke dealt with this by stating that the first owner is that person who instils labour into the object, establishing a relationship that will denote ownership.[212] Some other contemporary philosophers proposed different approaches. One of the most popular was to see property as consent given by the rest of humanity onto the owner. A proponent of such a theory was theologian, Hugo Grotius, who separated the rights of the State to appropriate a thing and the individual's right to compensation, and first discussed the realisation of modern economic links between property and the individual.[213]

As both of these interpretations seemed somewhat lacking, the principle of possession evolved in common law countries to explain property. This theory states that the original act of possession, or occupancy, is the basis for property. The possession is established against the rest of the community by two basic elements: firstly, there must be a clear act that informs others about the occupancy; and secondly, possession is given as a reward to the labour exerted in

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[210] Bettig, R. V. *Copyrighting Culture: The political economy of Intellectual Property*, Oxford: Westview Press, 1996, pp.16-17.

[211] Locke, J. *Second Treatise of Government* (1690), 3rd ed. Oxford: Blackwell, 1966, s.27.

[212] Ibid; s. 45.

[213] Rose, C. M. *Property and persuasion: Essays on the History, Theory and Rhetoric of Ownership,* Boulder: Westview Press, 1994, p.11.

acquiring the object.[214] Modern thought has brought more complex and sophisticated workings on the nature of property. A popular opinion understands property not so much as a right, but as a social relationship between individuals in a society, not so much as control over an object, but as a means of understanding the relationship between members of a society through exerting an exclusionary use of an object over another. This exclusion of usage works as an economic principle of allocation and control of resources, and by serving as a way to mediate conflicts that may arise from the competing desires for control of those resources.[215]

The practical application of these capitalist individual theories of property are evidenced in their adoption by modern political and economic models, mostly due to the French Revolution and the first French Civil Code, and later in the emerging Industrial Revolution, in the shape of liberalism. Criticisms to this system come from the same period of time by Marxist theories.[216]

It is clear that both intellectual and real property share a common philosophical and economic link, mostly due to the shared past and the fact that both are ownership tools of modern Western capitalist theory. Other similarities exist: in the present capitalist system, intellectual creations can be sold, bought and licensed; they can also be taxed, passed on as inheritance and in divorces; or they can be used as credit.[217]

However, that is where the similarities end, not only because the subject of both systems is entirely different, but also because there are many other differences between the property of ideas and of things. This can be assumed because ideas (or the expressions of ideas) are intangible, inexhaustible, non-excludable and non-rivalrous entities. Intellectual properties are a kind of property in some sense, although a *sui generis* one, mostly because it is a proprietary-like interest that entitles the owner to almost the same rights as those awarded to the owner of 'real' property. The main difference between both systems is the limitation of terms. Tangible property exists on a physical object or location indefinitely; even ancient artefacts are prone to be owned by whoever finds them, unless the government appropriates them. The same happens with land, where property rights are passed on from one owner to the other. Intellectual property is different in the sense that it has a limited duration for a fixed amount of years. In the case of

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[214] Ibid; pp.12-13.

[215] Ibid; pp.27-29.

[216] Cribbet, op cit. A detailed discussion of Marxist theory is beyond the scope of this work, and for pragmatic reasons, the discussion will concentrate on the capitalist model, which arguably has prevailed since the collapse of the communist system during the 1990s.

[217] Vaver, D. *Intellectual Property Law: Copyright, Patents, Trademarks,* Toronto: Irwin Law, 1997, pp.3-6.

patents, it is generally 20 years; in copyright, lifetime of the author plus 70 years. After that period of time the idea passes to the public domain and it can be used by anyone.[218]

The other main difference between tangible property and intellectual property is the existence of a moral element in intellectual property, in particular in trademarks and copyright. In trademarks, what is defended is the good name of a manufacturer or service provider. Copyrights protect moral rights of authors, in particular the right to be identified as the owner of a work and the right to the integrity of the work. These moral aspects are not to be found anywhere in real property rights.

1.2 The birth of national protection of ideas

There is plenty of literature that deals with the history of intellectual property,[219] so this is not the place to provide a detailed account. Nevertheless, it is necessary to recount part of this evolution to illustrate how it is that ideas were subjected to a limited ownership right, mostly because this model is now being exported to (and some would say forced upon) developing countries.

Although intellectual property as it exists today is a relatively recent institution, there are several indications that some aspects of the existing institutions were present in some ancient civilisations. For example, the Greeks were some of the first to attribute authorship of works to individuals, before that a system of oral tradition and communal attribution and ownership of ideas was prevalent. The Hebrew Talmud made it compulsory to oral contributors to a story to be identified, constituting an early form of moral authorship rights. Although there is no direct evidence that any sort of intellectual property existed in Ancient Rome, literary production became an accepted occupation for the wealthy classes, and some writers survived on a system of patronage; there is even evidence that some writers signed contracts with publishers.[220] The same moral attribution applied to inventors, as is the case with many early inventors, who have had their names placed together with their creations.

During the Middle Ages, it was assumed that authors possessed certain moral rights, but the implementation of laws protecting them was not a viable option because most intellectual creations were of a religious nature and the population was largely illiterate, which allowed the

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[218] Ibid; pp.12-13.

[219] Of particular note, see: Bentley, L. and Sherman, B. *The Making of Modern Intellectual Property Law*, Cambridge: Cambridge University Press, 1999.

[220] Bettig, op cit; pp.11-13.

Church to maintain a monopoly on information. However, the first intellectual property case takes place during this period. This case took place in 567 CE, and it was between St. Columba, who apparently was accused by his teacher Finnian of copying a Psalter of his.[221]

Despite the fact that the origins of intellectual property may be credited to the concept of moral rights, the real motivation behind this legal institution can be attributed to the desire of authors and inventors to obtain an economic remuneration from their work. The birthplace of modern intellectual property is England, both in patents and copyright. The first recognisable modern form of intellectual property was a Letter Patent, a document bearing the King's seal granting the bearer the right to practise their craft or art in England, the first one granted to a Flemish weaver in 1311. The first Letter Patent granted to an invention took place in 1449. The birth of the patent system to be granted as an exploitation monopoly for inventors took place during the reign of Elizabeth I, as it was felt that there was a need for the enactment of a method by which an inventor could stop others from copying and unfairly profiting from their work. Although monopolies were frowned upon by common law, the existence of a patent as an exception to the general rule was granted in section six of the Statute of Monopolies of 1623. [222]

The development of copyright was rather more complicated. It is widely accepted that the invention of the printing press and an increase in the number of colleges and universities created the necessary environment for the development of copyright laws. The first country where legislation was developed was England. In the early sixteenth century, Henry VIII gave a printing monopoly to the Stationer's Company, which lasted well into the next century.[223] In 1709, the English parliament passed the Statute of Anne, the first law to provide authors with a property right over their works[224]. It receives its name from Queen Anne of England, who was the Monarch at the time of its enactment. The Statute was enacted after a series of failed attempts to regulate licensing of literary works by means of a limited property right. Many literary celebrities of the time, like John Locke and Jonathan Swift, had a say in its creation after they had suffered from the piracy of their works.[225] Several other laws were passed enhancing

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[221] Bainbridge, op cit; pp.31-32.

[222] Ibid; p.320.

[223] Carlson, op cit; p.828.

[224] Phillips & Firth, op cit; p.124.

[225] Deazley, R. *On the Origin of the Right to Copy: Charting the Movement of Copyright Law in Eighteenth Century Britain (1695-1775)* , Oxford: Hart Publishing, 2004, p.12-21.

author's rights to other works such as paintings, sculptures, musical and dramatic works[226], until the present legislation, the Copyrights, Designs and Patents Act of 1988 (CDPA).

The modern proprietary version of copyright was exported to the United States very easily. While it was still a colony the right was part of the colonial legislations.[227] After independence, the United States Constitution recognised the nature of copyright as an economic reward to authors. Later, the US Supreme Court recognised this fact by stating that the "*encouragement of individual effort by personal gain is the best way to advance public welfare through the talents of authors…*"[228] The United States Congress adopted most of the British legislation by passing its own Copyright Act in 1790, hence the similarities between the two systems. This first act was limited to books, maps and charts. In following reforms, photographs, musical compositions and paintings were included. A new Copyright Act was created in 1909 to provide protection to several new inventions, such as perforated music rolls. This Act was almost immediately amended to include motion pictures. It was not until 1976 that another Act was passed by Congress to protect new technologies, such as tape recordings. This law is still in place, although it has been amended several times when new inventions require it. There have been acts of Congress to include protection of computer software (1980), semiconductor chips (1984), tape recording rentals (1984), software rentals (1990), digital audio recording (1992), digital performance (1995) and electronic theft (1997). [229]

1.3 International protection

The development of national copyright and patent regulation in the Anglo-Saxon world is certainly of great importance to the later creation of an international system, but the most influential country in the early progress of a multinational system was France. French intellectual property law took a different approach from the system favoured in England, which was slanted towards publishers' rights. France placed more emphasis on the moral rights of authors and inventors. After the French Revolution, several laws where enacted to implement a system of copyrights and patents based on these moral rights. For example, section 1 of the patent law of 1791 states that "*All new discoveries are the property of the author; to assure the inventor the property and temporary enjoyment of his discovery, there shall be delivered to him*

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[226] Bainbridge, op cit; pp.33-34.

[227] Vaidhyanathan, S. *Copyrights and Copywrongs: The rise of intellectual property and how it threatens creativity*, New York: New York University Press, 2001, p.38.

[228] *Mazer v Stein*, 347 US 201 (1954).

[229] Carlson, op cit; pp.829-836.

a patent for five, ten or fifteen years."[230] The 1793 copyright legislation follows the same philosophical background by establishing a *droit d'auteur* (literally, author's rights); with the added peculiarity that it recognised the existence of copyrights outside of France.[231]

It took almost a century for some of the ideals espoused by French legislation to be awarded international protection. It had been an increasing concern of authors and inventors that their works were being copied and pirated in other nations because national legislations, with the exception of France, did not recognise the rights of foreign authors or inventors. This situation came to a boiling point when many inventors refused to attend the International Exhibition of Inventions in Vienna in 1873 because they feared that their works would be copied and exploited in other countries.[232]

A few nations entered into reciprocal agreements for the mutual protection of artistic and industrial works, but it was not until the Paris Convention for the Protection of Industrial Property in 1883 that these efforts for internationalisation of intellectual property protection were solidified into the first international treaty relating to the ownership of technology. This treaty allowed the nationals of one country to obtain protection of their works in the other signatory nations, and it covered inventions (patents), trademarks and industrial designs.[233]

A similar problem had been experienced by authors, and during the 19th century there was rampant piracy of foreign works throughout the industrialised world. The *Association Littaeraire et Artistique International* was formed in Paris in 1880 in an attempt to implement some sort of international copyright protection. They produced a working document that would later become the Berne Convention for the Protection of Literary and Artistic Works 1886. One of the most notable points of this international instrument is that it provided protection for economic factors, much in the spirit of British legislation, as well as protection for moral rights, in the spirit of the Continental legal tradition. One of the main features of the treaty is that it allows for the automatic copyright protection of any original work without requiring registration.

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[230] Ladas & Parry. *A Brief History of the Patent Law of the United States*, 1999. http://www.ladas.com/USPatentHistory.html

[231] Walker D. *Heirs of the Enlightenment: Copyright During the French Revolution and Information Revolution In Historical Perspective*, December 2000. http://skipper.gseis.ucla.edu/students/dwalker/html/projects/documents/IS-200_Heirs_of_the_Enlightenment.pdf

[232] WIPO. *About WIPO*, June 2001. http://www.wipo.org/about-wipo/en/

[233] Ibid.

It is interesting to note the marked absence of the United States from the Berne Convention. Publishers in the United States greatly benefited from not having to pay royalties to foreign authors, thus enhancing their profits and making cheap European books available in the United States. It has been noted that:

> *"Influenced greatly by its early status as a net importer of copyrighted materials, the United States resisted joining the Berne Convention for over a century. Adherence to the treaty's conventions would have required U.S. publishers of foreign works---many of whom produced pirated copies---to pay royalties and fees to foreign copyright holders, thus causing a significant amount of money to go overseas."*[234]

This reticence by the United States continued throughout most of the 20th century, although this isolationism meant that other countries could pirate American works. After the Second World War, it was felt that it would be in the best economic interest of the United States to implement some sort of international protection. That is why the US sponsored the Universal Copyright Convention (UCC) of 1952, which, unlike the Berne Convention, worked only as a means of allowing foreign nationals access to the existing copyright legislation in foreign countries. This was clearly beneficial for the United States, as most countries had provisions that allowed protection of foreign works because of the Berne Convention, but the US did not. This allowed American authors to claim their copyrights abroad, but it still did not allow foreign nationals to be able to claim royalties from American publishers.[235] Eventually the US ratified the Berne Convention in 1987.

Both the Paris and Berne Conventions prompted a new era in international intellectual property cooperation, being administered by a joint international organization called the *Bureaux Internationaux réunis pour la protection de la propriété intellectuelle* (BIRPI), which was based in Berne and lasted well into the 20th Century. The two treaties were not based on a system of reciprocity, but rather on a common minimum requirement of rights that should exist in the national legislation of the signatory countries. The other main requirement is that local legislations should warrant foreign authors and inventors the same rights awarded to nationals. These rules would allow for more independence from each country when determining the adequate levels of protection that will be awarded in that territory.

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[234] "Copyright, International*", West's Encyclopaedia of American Law*, Boston, MA: West Publishing, 1998.

[235] Ibid.

Several other treaties were established to address and to add to the existing agreements, but they remained for many years the main source of international protection, and the basis for the existing system. Amongst these other treaties it is important to mention the Madrid Agreement Concerning the International Registration of Marks in 1891, the Hague Agreement Concerning the International Deposit of Industrial Designs of 1925, and the Patent Cooperation Treaty of 1970.

One of the most important modern developments in international intellectual property protection is the establishment in 1967 of the World Intellectual Property Organisation (WIPO), a direct descendant of BIRPI. The original function of WIPO is to administer the existing and future international treaties regarding intellectual property protection, and to promote harmonization of national legislation.[236] WIPO administers twenty-three different treaties relating to intellectual property subjects, of which the most important are the 1996 WIPO Copyright Treaty, the 1996 WIPO Performances and Phonograms Treaty and the 2000 Patent Law Treaty.

Other than WIPO, there are three other organisms that are involved in the area of international trade aspects of intellectual property. The most obvious of these is the WTO, which manages the 1995 Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS), which is the most important treaty dealing with developing countries. The administration of TRIPS is done through an administrative body known as the Council for Trade-Related Aspects of Intellectual Property Rights, which consists of the member states of the WTO.[237] TRIPS will be dealt with in more detail in the next chapter.

Another organisation involved in trade aspects of intellectual property is the United Nations Educational, Scientific and Cultural Organization (UNESCO), which administers the aforementioned UCC. The role of UNESCO is mostly to encourage the wider exploitation of intellectual works attempting to ensure the widest dissemination of science and technology. In that respect, it varies largely from the proprietary preoccupations of the WIPO and WTO. Another UN organisation that deals with this area is UNCTAD, which as has been discussed, deals mostly with establishing international rules on licensing of technological innovations in areas like technology transfer.

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[236] World Intellectual Property Organisation. *About WIPO*. op cit.

[237] Ibid.

The existence of all of these treaties regulating the protection of the ownership of ideas serves as a strong indication of the importance that is given to this field in the international arena. The evolution from national intellectual property legislation towards an international body of agreements has served to impose the Western model of protection around the world.

2. The justifications for intellectual property

From reading the historical development of intellectual property, it becomes clear that the institution of awarding individuals and companies with a limited property right to their technology is stronger than ever, mostly when considering the giant steps taken in the area of international protection. What are the justifications that merit the existence of the system of technology ownership that has been discussed?

This is actually a difficult question to answer. The fact is that there have been many different interpretations of the theoretical justifications of intellectual property rights. The opinion on what exactly is the rationale behind this institution is a subject of heated debate; it depends largely on the philosophy and the ideology of the person discussing it. Intellectual property is described as a natural right, as a reward for creators, a stimulus for creativity, a property right, an economic reward, as a fence, as a result of capitalism, and as part of the public interest. It would take a separate work entirely to try to analyse in detail all of the prevalent discussions and classifications for justification of intellectual property rights and their respective critiques. However, it is possible to notice a trend that divides the justifications in two main categories by using a teleological approach: public interest and private interest justifications, usually expressed as moral justifications and utilitarian justifications.[238]

2.1 Moral Justification

The moral justification for intellectual property stems from an ideal view that assigns property as a natural right of humans. The moral justification places the existence of intellectual property as a natural result of the right of the creator of anything s/he produces. To return to an earlier point, this is the classical ownership opinion as viewed by Locke, which states that individuals have a moral right to the fruits of their labour. In contemporary thought, this view is strongly advocated by libertarian and other "natural rights" capitalists. Ayn Rand for example claims

[238] Davies, G. *Copyright and the Public Interest*, New York: VCH, 1994, pp.10-13.

that "*patents and copyrights are the legal implementation of the base of all property rights: a man's right to the product of his mind*."[239]

As discussed in the historical introduction to intellectual property rights, in the past, copying another person's work was considered immoral. Authors then were given moral rights to their works, but no economic reward. This moral consideration has subsisted through most of the history of intellectual property, and it is an important basis for the international system of the ownership of ideas.

In particular, the law of copyright benefits as the main recipient of this view of intellectual property as a moral right, and it derives from natural law ideas that see it as inherent to the very nature of creating because it carries the author's "*integrity and personal reputation*".[240] It is more commonly found in countries with a civil law system that draws from concepts of natural law, and by implication, in the Berne Convention. According to this system, every author will be entitled to the moral right to ensure that no derogatory use of the work is made (integrity) and to make sure that it is rightly attributed under his or her name (paternity). This right is not patrimonial in nature, that is, it cannot be exhausted or alienated.

Patents were also subject to the theory of moral rights, in particular in 19th century France. The French patent system goes as far as implying that there should be no distinction between intellectual property and normal property, as they both derive from an innate human right to own one's personal creations.[241]

The idea that sees intellectual creations as a basic right creates problems as it does not explain the reason for the state to limit those same rights in time, which is exactly what happens with patents and copyright. This justification is not without its critics, which can be traced back to the English patent abolitionism movement of 1852, led by Robert Macfie.[242] This movement attempted to abolish the patenting system, and Macfie attacked several of the justifications, including the moral right attribution of ownership. He did this by commenting that the moral right of a patent should not be granted because "*Those things that belong to the province of*

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[239] Rand, A. *Capitalism: The Unknown Ideal*, New York: New American Library, 1966, p.125.

[240] Phillips, & Firth, op cit; p.241.

[241] Penrose, E.T. *The Economics of the International Patent System*, Baltimore: Johns Hopkins Press, 1951, pp.1-5.

[242] For a detailed look at the developments of this debate, see: Janis, M. "Patent Abolitionism", *Berkeley Law Technology Journal*, Vol.17, Issue 17:2, Spring 2002.

patent right are in their nature capable of being independently discovered or originated, in the same identical form, by a plurality of persons."[243]

In a similar line of thought, Hettinger points out that according to the moral or natural rights justification, the labourer would be entitled only to the value added by their labour. He states that this creates an unworkable system, as it would be impossible to ascertain just how much labour has been added.[244] Hettinger does not deny creators the exclusive right to possess and use for personal purposes what they develop. The problem he sees is in trying to impose that right upon society by means of intellectual property. This is not so much a moral right, as the result of social circumstances that have decided to allocate certain privileges to creators. He claims that:

> *"The 'right' to receive what the market will bear is a socially created privilege, and not a natural right at all. The natural right to possess and personally use what one has produced is relevant to the justifiability of such a privilege, but by itself it is hardly sufficient to justify that privilege."*[245]

Hettinger's criticism of this natural moral right of innovators and authors would seem extreme. Furthermore, it fails to address the other elements of moral rights which make up intellectual property; that is, the non-proprietary element of the moral rights awarded to creators. It is necessary to separate the natural property right element from the other assumed inherent element, that which is protected internationally as the moral rights to paternity and integrity. This right of creators would seem a much stronger natural right than the Lockean property right criticised by Hettinger. Legislation would seem to agree, making this a natural right which is inalienable and, in some jurisdictions, perpetual. This is opposed to the temporal shortness of the proprietary protection. It would seem that even if one follows Hettinger's criticisms and questions this theory, the moral right of an author to have their work attributed to them could still exist.

2.2 Utilitarian justifications

The utilitarian justification can usually be seen as that which states that intellectual property exists with the utilitarian purpose of encouraging creation by awarding authors and inventors with the means of recuperating their investments. This justification can be subdivided into three sub-categories: social contract, economic, and reward.

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[243] Macfie, as cited by Janis, op cit; p.33.

[244] Hettinger, E. "Justifying intellectual property", *Philosophy and Public Affairs*, Vol.18, No. 1, Winter 1989, p.36-37.

[245] Hettinger. op cit; p.39-40.

2.2.1 Social justification: the social contract

The social justification for intellectual property assumes that there is some benefit to society benefit society involved, but also a private interest. There are two different ways in which this social justification can be seen. The first one would be to recognise that providing a property right over intellectual works serves as a stimulus to further creation.[246] The rationale is that awarding creators with a limited property over the expression of their ideas as a reward for their efforts will in turn encourage those rights-holders and others to come up with new ideas and new ways to express them. In particular, earlier copyright legislation stressed this point; both the Statute of Anne and the United States Constitution recognised that copyright was a way to promote science and technological advance by providing authors with the means to obtain profit from their works.[247] The US Constitution, when talking about the powers of Congress, stresses that the legislative body will have "*the power to promote the Progress of Science and useful Arts, by securing for limited times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries...*"[248]

The second social aspect of intellectual property is that by having a limited monopoly over their works, creators will be more inclined to share their work, which is in the public interest.[249] For the proponents of this view, intellectual property will be beneficial to the social body because it encourages the disclosure of works and inventions, making them available to society. If creators believe that they will profit from their work and other people will not steal their ideas upon disclosure, then these people will communicate their work to a wider audience.[250]

These two aspects of the social justification constitute a social contract between society and the individual, particularly in the area of patents. Patents can be seen as a contract between society and inventors, society gives the patentee a limited monopoly over their creation, and in return the owner discloses the details of their invention so that society can use it and improve upon it after the patent has expired.[251]

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[246] Mackaay, E. "The Economics of Emergent rights on the Internet", *The future of copyright in a digital environment*, Hugenholtz, B. ed; The Hague: Kluwer Law International, 1996.

[247] Carlson, B. "Balancing the Digital Scales of Copyright Law", *SMU Law Review* Vol.50, 825, 1997, p.829.

[248] As cited by Carlson, op cit; p.830.

[249] Davies, op cit; pp.12-13.

[250] Ibid, p.13.

[251] Kesan, J.P. and Banik, M. "Patents as Incomplete Contracts: Aligning Incentives for R&D Investment with Incentives to Disclose Prior Art", *Journal of Urban and Contemporary Law*, Vol.2, 2000, pp.23-55.

2.2.2 Economic Justification

Despite the fact that the origins of intellectual property owe a lot to the ancient idea of moral rights, the major influence motivating this legal institution can be attributed to the desire of creators to obtain an economic remuneration from their work, as illustrated by the earlier Patent legislation and the Statute of Anne,[252] and this justification is still relevant today. In the strictest economic sense, intellectual property is seen as a way to allow creators to be able to exploit and obtain monetary dividends from their works, allowing them to make a living by placing their creations on the market. This justification presupposes that without such rights there will not be any creation. This economic justification relates closely to that based upon the social.[253] In 1928, historian Roger Fry attacked the idea of the author as some sort of Bohemian character unconcerned with monetary affairs. He expressed that:

> *"Almost all artists who have done anything approaching first-rate work have been thoroughly bourgeois people — leading quiet, unostentatious lives, indifferent to the world's praise or blame, and far too much interested in their job to spend their time kicking over the traces."*[254]

On a strictly economic basis, this justification also resides on the fact that intellectual works have become hugely profitable enterprises in the dawn of the information age. For example, in 1996, intellectual property industries accounted for a 3.6% of the United States GDP. In 2001, copyright industries alone accounted for 5.2% of that country's GDP.[255] Its importance for modern developed economies tends to act as enough justification and also serves to illustrate the reasons behind the trends towards increasing protection to technology.

2.2.3 Reward justification

Reward is closely related to the economic justification. Many types of intellectual creations require large monetary investment. Examples abound, such as for scholarly research, scientific or technological experiments, software development, recording music and motion picture production, just to name a few. The reward justification assumes that it is only fair that creators should have an adequate way to receive reimbursement for that investment by obtaining a property right over their work. This limited property right would also be awarded as a just

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[252] Bainbridge, op cit; pp.32-33.

[253] Vaver, op cit; pp.6-7.

[254] Fry, R. as cited by: Richardson, M; Gans, J. et al. *The benefits and costs of copyright: an economic perspective*, Redfern, Australia: Centre for copyright studies, 2000, p.7.

[255] Siwek, S. *Copyright industries in the US Economy*. Report on behalf of the International Intellectual Property Alliance (IIPA), 2002. http://www.iipa.com/pdf/2002_SIWEK_FULL.pdf

recompense to the skill, labour and investment involved in the creative process of the original work.[256]

This seems like one of the strongest justifications, as some of the most valuable types of modern technological developments would not be developed without large sums of money, but it illustrates clearly the contingent nature of intellectual property rights and their relationship to market development.

2.3 Criticising the utilitarian justifications

The utilitarian justifications are the ones that receive more criticism amongst experts. The social contract assumed in the existence of intellectual property has two socially desirable effects, the stimulation of new innovations and the encouragement of the dissemination of those innovations. In other words, awarding creators with a property right over their works will stimulate the creation and the distribution of said intellectual products.

However, this justification also has its problems. The idea of granting ownership rights over intellectual products as a means to encourage creation can be easily attacked if one can prove that creation takes place even without protection. The evidence would appear to be all around us, and even a look at history would seem to support this attack. Homer never earned royalties, and Archimedes never applied for a patent. Even in modern times, creation still takes place even in societies with minimum protection. As Van der Bergh points out, "*literature was no less extensive when copyright was non-existent*." [257] Posner goes as far as to give evidence that literature output before the Statute of Anne are proportionally similar to today's, hence dismissing the allegation that authors will produce more with copyright protection.[258]

Hettinger attacks the utilitarian justification by arguing that the granting of exclusive rights to intellectual creators is a paradoxical solution; by granting this right in hopes of encouraging creation, distribution of works is lost as it is placed in the hands of a few.[259] Another problem with the utilitarian justification is that it is always assumed, yet never tested. Several authors have pointed out that people created even before they had any access to monetary gains from their works. It would seem fair that creators should have the right to recuperate their investment

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[256] See: Hurt, Robert M. and Schuchman, Robert M. "The economic rationale of copyright", *American Economic Review*, Vol.56, 1966, p.430.

[257] Van den Bergh, R. "The role and social justification of copyright: a "law and economics" approach", *Intellectual Property Quarterly*, Vol.1, 1998, p.22.

[258] Posner, R. *Law and Literature*, Cambridge MA: Harvard University Press, 1989, pp.338-352.

[259] Hettinger; op cit, p.48.

through the granting of a property right as means of a reward. Nevertheless, Volkman points out that:

> *"Intellectual property is usually justified on the utilitarian grounds that we need to protect innovation by guaranteeing innovators a market return on their investment of time and effort. Otherwise, no one will create intellectual property. But this argument turns on empirical claims that are seldom examined or defended. Indeed, it is hard to imagine how such a defense could proceed, given that there is no easy way to conduct the relevant experiments."*[260]

In that same line, Samuelson argues that intellectual property has an anti-competitive element attached to it as it fosters the creation of monopolies.[261] These monopolies operate in a separate market to that of physical goods and commodities. The distribution of intellectual works rests in the existence of a "marketplace of ideas", where new ideas are shared according to their intrinsic value and usefulness. The main proponent of this ideal marketplace is philosopher Jurgen Habermas. Habermas explains that in this marketplace, everybody is allowed to participate, but eventually the best ideas will win out.[262] It would seem evident that although the participation in the marketplace is wide in societies that protect the principles of freedom of speech and thought, not all ideas get proper distribution, and not always the best idea wins. Environmental scientist Brian Martin points out that there is no reason why this marketplace should be a market of owned ideas, and further makes the point that the system of intellectual property has created a marketplace where only those ideas of economic interest are distributed, with no regard to other measure of their value. He goes on to say that:

> *"There is a simple and fundamental reason for the failure of the marketplace of ideas: inequality, especially economic inequality. Perhaps in a group of people sitting in a room discussing an issue, there is some prospect of a measured assessment of different ideas. But if these same people are isolated in front of their television sets, and one of them owns the television station, it is obvious that there is little basis for testing of ideas. The reality is that powerful and rich groups can promote their ideas with little chance of rebuttal from those with different perspectives."*[263]

In strictly economic terms there are other reasons to doubt the utilitarian justification. Paul David argues that intellectual property exists because there is a market failure to produce

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[260] Volkman, R. "Software ownership and natural rights" *The Research Center on Computing & Society*, 2000 http://www.southernct.edu/organizations/rccs/resources/research/intellectual_property/volkman_nat-rights.html

[261] Samuelson, P. "On Authors' Rights in Cyberspace: Questioning the Need For New International Rules On Authors' Rights in Cyberspace", *First Monday*, Issue 4, 1996. http://www.firstmonday.dk/issues/issue4/samuelson/#dep1

[262] Habermas, J. *The Structural Transformation of the Public Sphere*, Cambridge: Polity, 1989.

[263] Martin, B. *Information liberation: Challenging the corruptions of information power*, London: Freedom Press, 1998, Chapter 3.

intellectual works unaided; hence the existence of governmental intervention in the shape of intellectual property protection. David explains that it is usually argued that, without this protection, authors and inventors will not create, as they will not be able to profit form their works.[264] However, he argues accurately that there is no way to determine if intellectual property is indeed the best solution to address this failure of the market to allocate resources to creators. The problem he sees with this is that knowledge cannot be easily commodified because it is what economists call a "non-rival good", which means that it can be owned by many people at the same time, analogous to a public good.[265] This of course does not mean that ideas cannot be seen as commodities at all, David makes the case that several parts of human knowledge can be seen as public goods, but that in some circumstances the application of specific know-how can produce an identifiable intellectual product, which is subject to proprietary protection.

It can even be argued that intellectual property is often used as a method of perpetuating economic dominance,[266] discouraging competition and innovation. This is achieved by using intellectual property, and in particular wide-reaching patents, to create an economic monopoly in one field of enterprise. An example of this would be a company that has dominance in a market and uses patents to perpetuate its market dominance, often not even exploiting these patents.[267]

Even the reward aspect of this justification would seem to be subject to attack. Hettinger argues that large amounts of research are undertaken with public funds. He explains that there are no reasons to try to continue to fund research with a system of public grants, if the results of that research are destined to be locked away under intellectual property regimes.[268] The whole dichotomy between public funding and the reward of private interests should be explored further in this debate.

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[264] David, P. "Intellectual Property Institutions as the Panda's Thumb: Patents, Copyrights and Trade Secrets in Economic Theory and History", *Global Dimensions of Intellectual Property Rights in Science and Technology*, Washington: National Academy Press, 1993; p.25.

[265] Ibid; p.26.

[266] The concept of market dominance is specific of the field of competition law. Dominance is defined by the European Court of Justice in *Hoffman-La Roche* as "*a position of economic strength enjoyed by an undertaking which enables it to hinder the maintenance of effective competition on the relevant market by allowing it to behave to an appreciable extent independently of its competitors and customers and ultimately of consumers*." For a concise book on this subject, see: Goyder, D. G. *EC Competition Law*, 3rd edition, Oxford: Oxford University Press, 1998.

[267] Several examples of this can be found in: Gilbert, R. J. and Newbery, D. "Preemptive Patenting and the Persistence of Monopoly", *The American Economic Review*, Vol.72, No.3, June 1982, p.514-515.

[268] Hettinger, op cit; p.49.

3. The end of intellectual property as we know it?

If one agrees that some of the justifications about intellectual property are problematic, then the question must be asked about its legitimacy in the international arena. After all, intellectual property is the method to protect technological innovations, and it is assumed that without this system, many enterprises there will less incentive to develop new technologies. The question as to whether or not intellectual property is the only available system is critical. This question is part of a debate taking place in academic circles with regards to the validity of the modern intellectual property system. There is a growing amount of literature that deals with the question of whether intellectual property has served its purpose and should be modified, or even replaced.

Talking specifically about copyright, Eve Athanasekou came up with a useful classification of those who criticise copyright,[269] which can be paraphrased to include the general field of intellectual property. The classification is:

IP Radicalism: is the view held by those who believe that intellectual property law is no longer viable, and that it will be replaced by other mechanisms.

IP Revisionism: is held by legal experts who are pushing for a revision of existing intellectual property laws.

IP Traditionalism: is the view held by those who think that no changes are needed.

IP Maximalism: is the opinion that intellectual property protection should be enhanced. Some of the proponents of this view are the intellectual property industries, such as the pharmaceutical, software, publishing and music industries.

The views from the first two categories will be analysed next, assessing if such criticisms can be taken seriously.

3.1 Standing on the shoulders of giants

Intellectual property will prove to be a valuable and viable system to encourage technological innovation if it proves that the development of new ideas cannot take place without it. However, imitation plays a very important role in the dissemination of new technologies as has been already established. There is also the interesting phenomenon of the sharing of ideas that must

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[269] Athanasekou, E. "Copyright in Cyberspace", *13th BILETA Conference*, Dublin, March 1998. http://www.bileta.ac.uk/98papers/athenas.html

be taken into consideration when discussing intellectual property. After all, if people create and share ideas without reward, this would serve to undermine further the existing justifications for intellectual property.

It can be said that the proprietary model of the ownership of ideas is not only recent, but that it runs against some basic societal principles and needs. This would seem to be part of the political arguments between the individual and the social. Modern economic theories – in particular capitalism – tend to view the individual as the ultimate measure, while some other models tend to view the human being as a member of society, whose expression cannot be separated from the social body. In more socially-oriented cultures, the sharing of information is seen as just part of the creative process, making individual contributions a rarity.

In the end, intellectual property deals with information, yet information is public and is difficult to fence. This public nature of information is what makes it remarkably difficult to pinpoint, and perhaps why there are so many critics of the intellectual property system. It may seem difficult to understand – and perhaps even counterintuitive – to believe that something which is incorporeal can indeed be subject to property, and how owners can claim money from the public in exchange for the transfer of an idea. Information then would seem to be the logical currency to share.

In this grand scheme of things, information is the result of a communitarian effort. Talking specifically about the writing process, McFarland describes the creative process behind writing as a community development, instead of an individual effort. He points out that information:

> *"…is the product of human thought and not itself corporeal, information is constantly changing, growing, combining, and creating offshoots. An intellectual work never springs pure and original from a single human mind. There are always influences. The language, the characters, the themes, and the structure of a novel all have their predecessors."*[270]

In the same line of reasoning, Hettinger observes that intellectual creations are not the result of individuals, but the result of a society. The creators do not exist in a vacuum, so they cannot claim full credit for their creations in that intellectual products are inherently "social products".[271] Coombe shares this view. She expresses eloquently that:

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[270] McFarland, M. "Intellectual Property, Information, and the Common Good", *4th Annual Ethics and Technology Conference*, Boston College, June 1999. http://infoeagle.bc.edu/bc_org/avp/law/st_org/iptf/commentary/content/1999060503.html

[271] Hettinger, op cit; p.37-38.

> *"Denying the social conditions and cultural influences that shape author's expressive creativity, we invest him with powers of expropriation and censorship in the name of property. Representing cultures in the image of the undivided possessive individual, we obscure people's historical agency and transformations, their internal differences, the productivity of intercultural contact, and the ability of peoples to culturally express their position in a wider world."*[272]

Similar to this view, designer Victor Papanek strongly criticises the proprietary system of intellectual property: "*I feel that ideas are plentiful and cheap, and it is wrong to make money from the needs of others*."[273] Sociologist Michael Polanyi adds his voice to this growing number of critics by noting that patent law is deficient because it tries to parcel sectors of the whole wealth of human knowledge, which is cumulative by nature.[274] The accumulation of knowledge has become one of the trademarks of present day innovation in almost all areas of human endeavour. Long comments that "*Continued product discoveries and innovations also rely increasingly on the knowledge gleaned from preceding ones and on generally available techniques that have made the process of innovation more predictable*."[275]

In his influential essay, "*Selling wine without bottles*", author John Perry Barlow suggests that information is currency, and that in the modern marketplace of ideas, information is used to buy more information. He talks of information as though it is a living organism, expressing that it wants to be free, reproduce, change and disseminate. A necessary corollary of Barlow's ideas is that sharing will, and indeed does, occur all the time. Information accumulates, reproduces and jumps from one end of the world to the other. Intellectual property would be inconsequential to this process, as it fails to account for the inherent inventiveness of human beings. Barlow expresses this by stating that:

> *"...there are the inexplicable pleasures of information itself, the joys of learning, knowing, and teaching. The strange good feeling of information coming into and out of oneself. Playing with ideas is a recreation which people must be willing to pay a lot for, given the market for books and elective seminars. We'd likely spend even more money for such pleasures if there weren't so many opportunities to pay for ideas with other ideas."*[276]

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[272] Coombe, R. J. *The Cultural Life of Intellectual Properties: Authorship, Appropriation and the Law*, London: Duke University Press, 1998, p.226.

[273] Papanek, V. *Design for the real world: human ecology and social change*, 2nd edition, London: Thames & Hudson, 1991, p.xi.

[274] Polanyi, M. As cited by David, op cit; p.28.

[275] Long, C. "Patents and Cumulative Innovation", *Washington University Journal of Law and Policy*, Vol.2, 2000. pp.229-246.

[276] Barlow, J. P. "Selling Wine Without Bottles: The Economy of Mind on the Global Net", *Wired*, 2.03, March 1994. http://www.wired.com/wired/archive/2.03/economy.ideas.html

There is an obvious element shared by all of the criticisms listed and that runs in line with the nature of technological and scientific development already described, and it is the value awarded to information due to its cumulative nature. Sharing then becomes the means of reproduction of information, corroborating Barlow's views of information as a living organism. The analogy of information as a living thing cannot be simply discarded as a ridiculous notion; scientific thought has been moving towards the identification of information as something analogous to a virus.[277] This is the theory of memetics, which views certain ideas as a viral unit known as a meme. Memes are ideas that spread and reproduce using humans as their hosts. The originator of this theory is biologist Richard Dawkins, who equates memes with genes. He says that:

> *"Just as genes propagate themselves in the gene pool by leaping from body to body via sperm or eggs, so memes propagate themselves in the meme pool by leaping from brain to brain via a process which, in the broad sense, can be called imitation. If a scientist hears, or reads about, a good idea, he passes it on to his colleagues and students. He mentions it in his articles and his lectures. If the idea catches on, it can be said to propagate itself, spreading from brain to brain."*[278]

This theory sheds new light on the nature of intellectual property. Can we possibly assign property to powerful ideas such as memes? If information is always striving to reproduce, how can we put a leash on it?

Scientific research is another field where the non-proprietary sharing of ideas and the cumulative process of knowledge is fostered. Scientists share their findings through publication in peer-reviewed journals. In fact, science relies heavily in this process, as expressed by Jacob Bronowski, who says that science is founded on an "*explicit social contract between scientists, so that each can depend on the trustworthiness of the rest*."[279] Science relies on this continuous sharing of ideas, where theories and hypotheses are reviewed and analysed by others; this tends to create a dynamic environment that checks scientific thought for errors and flaws. This is the real marketplace of ideas, where memes live and interact with one another. As Newton famously said, we are standing on the shoulders of giants.

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[277] Some may contend that a virus is not really alive, the scientific debate over this issue rages on. See: "virus" *Encyclopædia Britannica*. http://www.britannica.com/eb/article?eu=108440

[278] Dawkins, R. The Selfish Gene, Oxford: Oxford Paperbacks, 1989, p.186.

[279] Bronowski, J; as cited by: Gratzer, W. *The undergrowth of science*, Oxford: Oxford University Press, 200, p.vii.

3.2 The death of the Romantic author and the Heroic inventor

It could be argued successfully that the modern system of intellectual property is a direct result of the shift in the definition of authorship and invention, from that of a common effort to the birth of the ideas of the Romantic author and the Heroic inventor.[280] This structure of the individual searching to obtain profits from the labour of their mind is indeed one of the justifications for intellectual property already explored. The end result of this view is the present system in which property in the intellectual expressions of the human mind is protected by the law with increasing force, as has been proven in previous chapters. The problem is that this view is often at odds with the other element of intellectual property; the need to ensure that society has access to the fruits of those intellectual creations in one way or another. This eternal struggle between disclosure of information and its suppression is one of the major points of debate and criticism in this field. The Bellagio Declaration recognises this struggle by commenting that:

> *"In general, systems built around the author paradigm tend to obscure the importance of "the public domain," the intellectual and cultural commons from which future works will be constructed. The assumption of these systems is that one must reward creators in order to ensure new production. Yet the "reward" has its costs. Each intellectual property right, in effect, fences off some portion of the public domain, making it unavailable to future creators. If one is concerned about promoting future production of books, ideas, inventions, and works of art, then one must be just as careful in one's protection of a vigorous and diverse public domain, a "commons" of scientific, literary, and artistic raw material, as one is in one's protection of the author's rights and incentives. Recently, there has been a dangerous international tendency to suppress the former concern and to concentrate only on the latter."*[281]

What the experts in the Bellagio Declaration mean by this is that intellectual property was created with another era in mind. In other words, the continued use of the paradigm that protects intellectual creations, as the result of a figure which no longer exists, is not only problematic, but is eroding the existence of the public domain. Yet the cultural images of Thomas Edison, Mark Twain, Charles Dickens, Enrico Marconi and Ernest Hemingway as the very personification of intellectual property are hard to shake off and are still paraded as a justification for the commodification of information, resulting in the system of intellectual property. Boyle for example, points out that "*...information property rights of scientists are*

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[280] Fatima, S. "A legal philosophy for technological informatics?" *15th BILETA Conference*, University of Warwick, April 2000. http://www.bileta.ac.uk/00papers/fatima.html

[281] *The Bellagio Declaration*. From the Cultural Agency/Cultural Authority: Politics and Poetics of Intellectual Property in the Post-Colonial Era Rockefeller Conference, 1993. http://www.cwru.edu/affil/sce/BellagioDec.html

portrayed as necessary incentives to innovation. This assertion is not supported by data or analysis. It simply flows from the assumptions of romantic authorship."[282]

The problem presented by adhering to this Romantic view cannot be underestimated. In particular, it would appear that this paradigm no longer reflects the realities of the creative process. Evidence for this is the fact that in contemporary times, the Romantic author and the Heroic inventor are no longer the largest producers of intellectual works; their place has been taken over by large intellectual property industries. When the individuals are taken from the equation, one can see a case being made for the utilitarian justification. Vaver points out that:

> *"Since the onset of industrialisation, the individual creator and inventor has been pushed to the sidelines. Most creative and inventive work is not done by individuals; it is done by teams, and the creativity and inventiveness is part of a process designed to put a product on the market. Occasionally, the creativity is that of the team itself. More often, it is directed by the firm that employs the team. Most copyrights and patents do not belong to their individual creators and inventors but to the firms that employ them."*[283]

Perhaps two of the most cited proponents of this view are Peter Jaszi and Martha Woodmansee, a copyright lawyer and a literary expert respectively.[284] Woodmansee for example makes the point that individual creativity was not the norm before the advent of the Romantic author, and that many of the works from the 18th century are responsible for shaping this mythical figure and helping to cement the nascent institution of intellectual property law.[285] The point is that this Romantic notion no longer applies – Woodmansee argues that it probably was never relevant – and that we are seeing a return to collective authorship. Yet the myth remains. In fact, Woodmansee comments that "*it would seem that as creative production becomes more corporate, collective and collaborative, the law invokes the Romantic author all the more insistently*."[286]

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[282] Boyle, J. "A Theory of Law and Information: Copyright, Spleens, Blackmail, and Insider Trading", 80 *California Law Review*, 1992.

[283] Vaver, D. "Intellectual Property Today: Of myths and Paradoxes", *Canadian Bar Review,* Vol.69, No. 1, March 1990, p.104.

[284] However, the popularisation of the use of this idea in the debates criticising intellectual property can be traced back to James Boyle. See: Boyle, J. *Shamans, Software, and Spleens: Law and the Construction of the Information Society*, Cambridge MA: Harvard University Press, 1996. Criticism to Boyle's view can be seen here: Lemley, M. "Romantic Authorship and the Rhetoric of Property", *Texas Law Review*, Vol.75, 1997, pp.873-886.

[285] Woodmansee, M. "On the Author Effect: Recovering Collectivity", *The Construction of Authorship: Textual Appropriation in Law and Literature*, Woodmansee, M and Jaszi, P. eds; Durham: Duke University Press, 1994, p.22-26.

[286] Ibid; p.28.

Jaszi's analysis of the subject enhances that of Woodmansee with legal arguments.[287] In particular, he comments that the legal application of the law has been desperate to use the figure of the Romantic author as one of the main justifications for the existing system, sometimes even in rulings where the opposite to this individual view was being discussed. An example of the latter would include the case of "work for hire", where the authorship of an intellectual work is given to the employer and not the author.[288] Another interesting case put forward by Jaszi is his valid opinion that modern legislation, doctrine and case law tend to neglect the figure of collective authorship and instead focus on the individual Romantic concept.[289] This view is not without its critics. Fatima for example argues strongly that the law does recognise the figure of the Romantic author, but that it also favours the collective approach.[290] It would seem that Jaszi's idea is closer to the truth; even a cursory look through present legislation makes it evident that individual creators would appear to be at the centre of the written law.

This erosion of the traditional concept of authorship is made more evident on the internet, where users tend to write with anonymity in mind. One of the results of such anonymity is the failure to identify authors. In this case there cannot be any sort of proprietary rights, as the creator of a work cannot be readily identified.[291] This phenomenon of anonymity is one of the defining characteristics of internet life because of the prevalent use of internet nicknames or avatars.

It appears that the idea of the Romantic author is not the only figure under attack. The other pillar of the equation, the lone and brilliant inventor, would appear to be a rarity as well, a myth created from the example set by a few brilliant individuals. Former US Patent Office Commissioner Bruce Lehman even went to the lengths of describing individual inventors as "weekend hobbyists".[292] Some statistics would seem to support this monumental shift; patent applications from independent inventors in the United States made up 86% of the total of applications presented during 1910, while the same figure had diminished to an astounding 15%

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[287] The argument has been somewhat criticised, but it must be pointed out that Lemley's criticism against Boyle does not really have too much bearing in Woodmansee's argument.

[288] Jaszi, P. "On the author effect: Contemporary copyright and collective creativity", Woodmansee, and Jaszi, op cit; p.33-35.

[289] Ibid, p.50-55.

[290] Fatima, op cit.

[291] For more on the phenomenon of Internet anonymity, and its legal implications see: Grijpink J. and Prins J. "New Rules for Anonymous Electronic Transactions? An Exploration of the Private Law Implications of Digital Anonymity", *Journal of Information, Law and Technology*, 2001 (2). http://elj.warwick.ac.uk/jilt/01-2/grijpink.html. See also: Reed, *Internet law: text and materials*, London: Butterworths, 2000.

[292] Chartrand, S. "Patents; A Federal agency, in transition, reaches out to independent inventors with a new department" *New York Times*, April 5, 1999, section C, p.2.

in 1998.[293] These inventors are also 25% less likely to bring their inventions to the market than their corporate counterparts.[294]

All of these examples serve to enforce the view that authorship of a work or invention is on the decrease, while the emphasis increasingly lies with the concept of ownership. The work for hire is just one case of this, intellectual property deals more and more with collective works where the author has taken second place behind those who pay for the work. The largest and most successful intellectual property industries are almost entirely the result of collaborative efforts between individuals and commercial interests. The field of pharmaceuticals, biotechnology, software, recording and film production are just for a few of the examples of this. Even in the traditional fields where intellectual property can be more readily identified with the Romantic ideas – such as literature – one can make the case that these "Romantic" authors would be nothing without the massive support awarded to them by the literary industry.

3.3 Looking for the elusive commons

One of the other important aspects that are brought forward by the intellectual property radicalism and revisionism is the detrimental effect to the public domain that is caused by the seemingly unstoppable trend towards stronger intellectual legal protection. The public domain is the intellectual commons, the information that should be accessible by the whole of humanity and which lacks proprietary protection mechanisms.

The Oxford English Dictionary defines the commons as something "*Belonging to all mankind alike; pertaining to the human race as a possession or attribute.*"[295] In other words, the "commons" means the public space, the existence of objects and ideas that can be used by all the members of the human race. It is of course evident that not everything can belong to this common space, hence the existence of the system of private property. However, it is possible to distinguish between different types of common property. This is where we return to the economic concepts of rival and non-rival resources. Professor Lawrence Lessig draws upon this distinction and applies it to the commons. He describes several rival goods that are in the public domain, such as roads, parks and beaches; these resources cannot be used by everybody at the same time. He also describes several non-rival resources; such as Einstein's theory of relativity,

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[293] Dahlin, K; Finchman, M and Taylor, M. *Differences in inventive content between independent and corporate inventors*, Rotman Working Paper Series, May 2000. http://www.rotman.utoronto.ca/bicpapers/pdf/2000-07.pdf

[294] Ibid.

[295] "Common" *Oxford English Dictionary*, 2nd edition, 1989.

or poems. [296] The fact that ideas are non-rival in nature gives the public domain for such intellectual creations a very different nature from that of their rivalrous counterparts. While rival resources may suffer from over-consumption, non-rivalrous ones do not; millions can read the works of Shakespeare, yet those works are still there after they have been read.[297] The question then is whether we should assign rivalrous rules to non-rivalrous resources. The answer to this can be found in the justifications for intellectual property. In those justifications, it all comes down to trying to encourage people to produce these resources, hence placing them outside of the commons for a period of time.

The commons is one of the most important elements of the social contract that supports some elements of intellectual property because part of the contract is an assumption that intellectual works will eventually be freed from proprietary restrictions and humanity will be able to benefit from them.[298] The commons serves as the light at the end of the tunnel; we allow limited proprietary rights to intellectual creations as a means of encouragement with the understanding that after a period of time those protected ideas will end up in the commons, accessible to all. This would establish an intrinsic relationship between public domain and intellectual property legislation, where the latter owes its existence and its reason for being to the former. This is often forgotten.

Boyle does issue a warning to all critics of intellectual property, reminding that the public domain is the ultimate motivation for the criticisms, and not intellectual property itself. In other words, defence of the public domain would appear more desirable than an attack upon intellectual property. He says that the comments against intellectual property "*are framed as criticisms of intellectual property rather than defenses of the public domain or the commons, terms that appears rarely if at all in the debates. There is no real discussion of the world of intellectual property's outside, it's opposite*."[299]

The challenge then is to understand that the commons of ideas is the goal of society, regardless of the system of ownership that precedes it. Society cannot permit existence of a system that protects intellectual creations *ad perpetuam*. There must be an end which will allow access to ideas for the widest possible audience without restriction; these ideas are a non-rival resource,

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[296] Lessig, L. *The Future of Ideas: the fate of the commons in a connected world*, New York: Random House, 2001, p.20-21.

[297] Ibid; p.21-23.

[298] Litman, J. "The Public Domain", *Emory Law Journal*, 39, 1990, p.1023.

[299] Boyle, J. "The Second Enclosure Movement and the Construction of the Public Domain", *Conference on the Public Domain*, Duke University, November 9-11 2001. http://www.law.duke.edu/pd/papers/boyle.pdf

even if the system of protection recognises creators with the rights necessary to encourage the production of such works.

This perception of the commons as a goal is under increased threat. It would seem that intellectual property protection is on the increase, diminishing the role of the commons, and turning ideas into proprietary environments. Copyright expert Jessica Litman masterfully describes another interesting example of the erosion of the public domain by the passing of an extension of copyright terms. She explains that as copyright terms were extended a further twenty years, publishers of public domain books had to wait that time to make these books available, effectively eroding the public domain and restricting the access of the public to such works.[300] During the debate in the US Congress in which this extension was considered, movie industry representative, Jack Valenti, made perhaps the most chilling comment against the public domain:

> *"Whatever work is not protected is a work that no one preserves. The quality of the print is soon degraded. There is no one who will invest the funds for enhancement because there is no longer an incentive to rehabilitate and preserve. A public domain work is an orphan. No one is responsible for its life. But everyone exploits its use, until that time certain when it becomes soiled and haggard, barren of its previous virtues. Who, then, will invest the funds to renovate and nourish its future life when no one owns it? How does the consumer benefit from that scenario? The answer is, there is no benefit."*[301]

Somebody should perhaps have reminded Mr. Valenti that Homer, Plato and Aristotle are still being published centuries after they were written. What this serves to illustrate is that there is a growing culture that dismisses the commons because they serve no economic purpose. Under this scheme, everything must be owned.

4. A future without intellectual property?

Can we envision a future without intellectual property? Despite the fact that there appears to be no shortage of those who criticise intellectual property, those who are willing to propose alternatives are remarkably few. For all of the criticisms that have been expressed so far, solutions and alternatives are in short supply. This does not mean that there are none.

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[300] Litman, J. *Digital Copyright*, New York: Prometheus Books, 2001, p.23-24.

[301] Valenti, J. *Testimony before the Subcommittee on Courts and Intellectual Property, US House of Representatives*. Hearing on Copyright Term Extension Act, H.R. 989, June 1, 1995. http://www.house.gov/judiciary/447.htm

4.1 The reward model

The most valid alternative proposed is that of a reward model, which is based on the award of a monetary payment by the government to innovators and authors, with the result of such works being placed in the public domain. This system is not new; it dates back to the abolitionist debate in Britain, where a similar proposal was put forward as a viable alternative to the patent model.[302] This is also advocated by socialists in regards to intellectual property rights, as it is more in accordance with the socialist view of property, and hence of its intellectual cousin. Under this socialist version of the reward model, the existing proprietary model of protection would be replaced with a system of state subsidies and social benefits for creators. This system was used in the Soviet Union, and Social Democratic nations such as Sweden and Norway have considered at some point a similar model; Norway went as far as to implement such a scheme for a short period in 1956.[303]

Hettinger would appear to favour this view as well, as he advocates a return of a patronage system funded by the state. This system would work in a way similar to research funding seen in academia, and the effect of such a state reward program would result in the works passing immediately to the public domain.[304] A similar proposal to this system comes from Barlow, who is perhaps one of those few critics of intellectual property who is actually proposing alternatives. He states that:

> *"The other existing, model, of course, is service. The entire professional class - doctors, lawyers, consultants, architects, and so on - are already being paid directly for their intellectual property. Who needs copyright when you're on a retainer? In fact, until the late 18th century this model was applied to much of what is now copyrighted. Before the industrialization of creation, writers, composers, artists, and the like produced their products in the private service of patrons. Without objects to distribute in a mass market, creative people will return to a condition somewhat like this, except that they will serve many patrons, rather than one."*[305]

At first glance, such a system would appear to be unworkable, the result of wishful thinking prompted by a leftist distrust of intellectual property. Nevertheless, there appears to be sound evidence to support such a system. In an interesting study by economists, Steven Shavell and

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[302] Dutton, H. I. *The Patent system and Inventive Activity during the Industrial Revolution, 1750-1852*, Dover (NH): Manchester University Press, 1984.

[303] Davies, *Copyright and the Public Interest*, op cit; p.149-150.

[304] Hettinger, op cit; p.51.

[305] Barlow, op cit.

Tanguy Van Ypersele, the reward model is compared with the existing intellectual property system from a mere economic standpoint.[306] Their reward model is based on the optional co-existence of a double-pronged reward system, based upon patents and government grants. Creators can choose whether they will apply for a patent or for a grant. If they apply for the latter, then the work will remain in the public domain.

Shavell and Van Ypersele's findings are surprising. They argue that the proprietary model is not economically superior to an optional reward system – optional because creators will decide whether or not they want to enter into such a scheme. Part of their argument rests on a point made earlier in this work, that the existing intellectual property system has been unchallenged, and its justifications have gone untested. They contend that these justifications do not survive economic scrutiny by saying that under the existing intellectual property system – in particular patents – the reward obtained by a creator takes the shape of a limited monopoly. The problem with this is that it produces two key negative economic elements:

> *"First, incentives to invest in research are inadequate because monopoly profits are less than the social surplus created by the innovation. Second, if an innovation results, there is a deadweight loss in social welfare because too little is sold at the monopoly price."*[307]

This would seem to corroborate the observation that imitation often works. It is evident that intellectual property rights increase the price of products and diminish their social impact because they are not as widespread as they would be if they were in the public domain. In contrast, the reward system as described by Shavell and Van Ypersele (and as distinct from the reward elements of an intellectual property system) does not have these negative points. The authors argue that:

> *"Under the reward system, the innovator's incentive to invest in research is the reward he would receive. If the innovator produces an innovation, it will be available to competitors and so will sell at marginal cost (perfect competition in the market is assumed)."*[308]

Because there is thus no social loss from the award of a monopoly, the only disadvantage to this system would be the initial incentive to conduct innovation in the first place. The incentive to innovation may be higher in the proprietary system, but that is its only advantage, and that alone

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[306] Shavell, S. and Van Ypersele, T. "Rewards versus Intellectual Property Rights", *The Journal of Law and Economics*, Vol.XLIV (2) (Pt. 1), October 2001, p.525-547.

[307] Ibid; p.529.

[308] Ibid.

does not overcome the two inherent disadvantages explained. However, when an optional reward system is considered, the model is unambiguously in favour of reward on all counts. This is because, according to Shavell and Van Ypersele's model, in an optional system the innovator will choose the reward model over the proprietary one, eliminating the question of whether or not the proprietary model induces research.[309]

There are still several problems with this model, some of them recognised by the authors.[310] It rests on many assumptions, such as government efficiency in allocating resources to the research that merits funding and the cost of such a scheme to taxpayers, to name just two. The advantages are clear: there could be a race to be first in the market, there would also be no restrictions towards competitors improving the innovations, and the social benefit of immediate access to the innovations around the world cannot be underestimated. The proposal is indeed interesting, and merits further analysis from other economists.

4.2 A technical model: Digital Rights Management

A system that is increasingly being used by intellectual property owners is that of the implementation of technical protection, in particular for digital products such as computer software, digital music, and computer hardware.

These solutions are generally known as Digital Rights Management (DRM). If one thinks of intellectual property law as a legislative fence built by the government to protect intellectual creations, DRMs would be a fence built by the owners because the legislative one is not enough to protect their works, or in some instances, to enhance the rights awarded to them by legislation.[311]

There is an increased use of DRM to protect digital works, in particular within the copyright industry. There are several technological means which can be used to protect intellectual works from copying, such as encryption, hardware locking, compression, and many others.[312] Examples of these can be seen in a wide variety of new products, from Microsoft Windows to DVDs.

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[309] Ibid; p.530-531.

[310] Ibid; p.541-545.

[311] For a more detailed study of some of these technical fences, see: Guadamuz, A. "Copyright in Cyberspace: Building fences on the Internet", *Alfa Redi, Revista Electrónica de Derecho Informático*, No. 109, Octubre 2002. http://www.alfa-redi.org/upload/revista/101602--19-26-Building%20fences%20on%20the%20Internet.DOC

[312] For a detailed list of technologies, see: Wayner, P. *Digital Copyright Protection*, London: Academic Press, 1997.

The idea behind DRMs is that the owners of intellectual creations will have strict control over what is done with their products, opening a can of worms for the legal profession. It is perfectly possible that industries will sell CDs which will only play three times, and after that you would need to buy a new one. It is also possible that some products will only work with digitally approved players or hardware. Another possibility is that in some cases, software and hardware will have monitoring and reporting capabilities which will tell vendors if somebody is misusing their products, being able to shut them down remotely. This is the case with so-called Palladium technology being developed by Microsoft.[313] The question is not whether these technologies will be developed, but how.[314]

The prospect of a completely unregulated set of rights has several implications for intellectual property law. One of the most obvious implications is that it may lead to an information lock-up to the detriment of the public interest, as owners could simply assume beforehand what types of activities users will be allowed to perform with their products, eroding public interest and fair dealing of intellectual property works.[315] The fact that this system is on the increase, and is largely unlegislated, certainly opens up several questions about the validity of intellectual property. Thomas Vinje makes an excellent point when he comments that:

> *"Even if legislators succeed in retaining an appropriate balance between rights, limits and exceptions, to what avail will this be if rightholders can effectively replace this copyright regime with a private one of their own making that takes no account of copyright limits and exceptions?"*[316]

DRMs then have the potential to bypass completely intellectual property legislation to make it a matter of contractual protection between users and owners. The rights of the consumer will be those awarded contractually by the owners, enforced not by the law, but by technological tools. A perfect example of this sort of enhancement of intellectual property legislation can found in the courts, for example, in *ProCD v. Zeidenberg*,[317] where a contract was used to enhance existing intellectual protection of databases.

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[313] Anderson, R. *TCPA / Palladium Frequently Asked Questions*, Version 1.0. http://www.cl.cam.ac.uk/~rja14/tcpa-faq.html

[314] King, B. "Digital Rights Outlook: Squishy", *Wired*, September 12, 2002. http://www.wired.com/news/mp3/0,1285,55006,00.html

[315] Bell, T. W. "Fair Use Vs. Fared Use: The Impact of Automated Rights Management on Copyright's Fair Use Doctrine", *North Carolina Law Review*, (76) 1998, p.557-618.

[316] Vinje, T. "Copyright Imperilled?" *European Intellectual Property Review* (E.I.P.R.), Issue 4, 1999, p.196.

[317] *ProCD v. Zeidenberg*, 86 F.3d 1447 (7th Cir. 1996).

Nevertheless, there are several problems with DRMs. One of them is that DRMs may prove to be too expensive and cumbersome to be efficient. Mackaay for example, points out that "*[digital] property rights are worthwhile so long as they offer a net return over cost comparable to other possible investments. Closing a hole in the fence may be costlier than the losses it prevents*"[318] In some other cases, the proposed technological fences have not been well received by the public because they impose unrealistic burdens upon the consumer.[319] These schemes are still vulnerable and open to being cracked or hacked. It can be argued that technical fences show a large amount of naiveté by underestimating hacker resilience and inventiveness. The sheer amount of hacked web sites and cracked software can serve as significant evidence of the urge of the internet hacking community to look for new ways of bypassing any type of protection.[320]

4.3 Other alternatives

Although the two alternatives mentioned are some of the most viable ones, they are not the only ones suggested.

The most viable alternative to the existing system of intellectual property, and in particular to copyright, is being used widely in the software community within the growing field of non-proprietary software development. Because this field has huge implications as a means of providing information technology to the developing world, it will receive more detailed coverage in the last two chapters. What is important to note here is that this model can be considered as further evidence that there are viable alternatives to existing proprietary models of intellectual creation; in fact, the popularity of the non-proprietary model of software development has to be taken as direct evidence against some of the utilitarian justifications for intellectual property, as it proves that creators will produce even if there is no economic reward waiting at the end of their labours.

Another model that has been proposed is that of offering real time intellectual creations in a pay-per-view model. Barlow strongly advocates such a system, stating that:

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[318] Mackaay, op cit. p.17

[319] See for example, the Secure Digital Music Initiative (SDMI), which was set to replace MP3s, but that was never popular. Anderson, L. and Warner, B. "Too Legit to Pirate? Record Labels Fight Back", *The Industry Standard*. December 16, 1998. http://www.idg.net/go.cgi?id=57248

[320] For an example of the cracking of the DRM built in DVDs, see: Guadamuz, A. "Trouble with Prime Numbers: DeCSS, DVD and the Protection of Proprietary Encryption Tools", *Journal of Information, Law and Technology* (JILT) 2002 (3). http://elj.warwick.ac.uk/jilt/02-3/guadamuz.html

> *"One existing model for the future conveyance of intellectual property is real-time performance, a medium currently used only in theater, music, lectures, stand-up comedy, and pedagogy. I believe the concept of performance will expand to include most of the information economy, from multicasted soap operas to stock analysis. In these instances, commercial exchange will be more like ticket sales to a continuous show than the purchase of discrete bundles of that which is being shown."*[321]

Some recent developments in internet technology may be providing the required basis for such pay-per-view schemes, perhaps fuelled by the widespread problem of piracy of digital works encountered in cyberspace. Examples of intellectual creators placing their works for a small initial fee or through pay-per-view schemes are starting to gain considerable ground in the academic arena.[322] One example would be the several file-sharing systems; these systems allow users to exchange music files which have been cleared by the authors, but require those users to subscribe to the service by means of a small fee.[323] With the further development of the internet as a place of commerce, it would seem possible that users will become more sophisticated, and purchasing works online will become more commonplace. This system would have the benefit to owners of immediate remuneration. As the marketplace becomes flooded with more creators, and the distribution chain is shortened because of the internet, it is possible that authors will simply not be that bothered with intellectual property rights, moving instead towards subscription systems based on micro-payments. This model has now become possible with the development of online payment models designed to encourage the system of small payments by means of electronic cash.[324]

After listing some of these suggestions, the question remains of how all of this could come about. How do these intellectual property radicals suggest that the present system can be overthrown? This question appears to have been neglected, but there are some willing to tackle it, albeit rather obliquely. Martin suggests that the inherent cost of the intellectual property system is expensive because of "*patent offices, legislation, court cases, agencies to collect fees and much else*"[325] and that such costs should be studied and publicised. He argues that after

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[321] Barlow, op cit.

[322] For a discussion about this and other digital copyright alternatives, see: Tuck, B. *Electronic Copyright Management Systems*. Final report of a study for eLib, July 1996. http://www.sbu.ac.uk/litc/copyright/ecms.html

[323] Some of these systems are described here: Thomas, A. "Online Music Piracy, Anonymity and Copyright Protection", *Entertainment Law Review*, 2001, 12(1), pp.1-4.

[324] The system that is becoming more likely to prevail is that of Mondex. For more on these new systems, see: Reed, C; Walden, I and Edgar, L. (eds) *Cross-Border Electronic Banking: Challenges and Opportunities*, London: Informa Business Publishing, 2000, p.167-231.

[325] Martin, op cit.

these costs have been presented to the public, the alternatives to intellectual property should become more appealing from a mere economic standpoint.

4.4. Necessity for change

Despite all of the listed criticisms to intellectual property, it would seem that the system is here to stay. To start with, it is evident from the previous section that there are several problems with the suggested replacements to intellectual property. Some appear sound, and in some cases they are even being successfully applied, but the problem with most of them is that they would appear to work better as a complement to existing intellectual property legislation, and not as an entirely different and novel set of proposals that would immediately serve to overhaul the proprietary system. Something else that has become evident is that none of the criticisms that have been presented would appear to be the silver bullet that kills intellectual property; they are more appropriately understood as calls for reform rather than calls for abolition. It would be disingenuous and perhaps even naïve, to believe that intellectual property law will simply disappear, and that owners of intellectual creations will give up their lucrative businesses to accommodate some few disgruntled individuals. The viable solution is then to move towards a rational change to the existing system to accommodate these criticisms.

Some of the critics mentioned agree with this view. Talking about the patent system in particular, Lessig points out that "*No doubt we are better off with a patent system than without one. Lots of research and invention wouldn't occur without the government's protection. But just because some protection is good, more isn't necessarily better.*"[326]

Other authors claim that even the internet serves as an example of the necessity for intellectual property protection:

> *"Although there may be a small but high-profile gift economy that flourished especially in its early experimental days, and a second wave of Internet "trading" in which companies are prepared to wait to see profits generated from their market activities after markets could be established, the current reality of the Internet is that much of the material that is now being published and traded there relies very strongly on copyright."*[327]

Infringement of intellectual property resulting from inadequate protection can also be a problem for the developing world. Alford warns against the consequences that such an abolitionist view

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[326] Lessig, L. "The Problem With Patents", *The Industry Standard*, April 23, 1999. http://www.thestandard.com/article/display/0,1151,4296,00.html

[327] Richardson, M; Gans, J. et al. *The benefits and costs of copyright: an economic perspective*, Redfern, Australia: Centre for copyright studies, 2000, p.8.

would have. Commenting on the Chinese economy and the effects that widespread intellectual property infringement has had, he states that:

> *"Emerging entrepreneurs are all too often unable to realize the fruits of their innovation. Businesses and educational centers find that the costs of needed foreign technologies and materials have risen to take account of infringement, if they are even available. The reassertion of artistic creativity…is threatened as authors and other artists are unable to collect royalties needed to sustain themselves in the absence of the state support they once enjoyed."*[328]

If reform is to be the solution, what shape should it take? This question is more difficult to answer. One of the most important suggestions would be to maintain the system roughly as it stands, but to enhance it by encouraging with public funds the development of various non-proprietary sharing schemes. There are several examples of such programs that further the ideas of public domain-based knowledge. One of these proposals is the Global Ideas Bank,[329] a group dedicated to the diffusion of non-technological ideas for the betterment of society, providing a cash prize each year to the best ideas. Another interesting scheme is Project Gutenberg,[330] an online group which digitises books that are in the public domain and makes them available online for free in an attempt to promote the distribution of ideas. Another interesting proposal is that of the Commons Group,[331] an organisation that provides technical assistance for non-profit organisations that want to provide public domain material online to a wide audience. There are many groups like these whose efforts could be well directed by public funds, as long as their goals of attempting to provide free distribution of ideas remain.

Nevertheless, such ideas are not enough without some sort of actual legal reform, both at national and international levels. This reform must start with the understanding that the relentless push towards stronger national and international protection is counterproductive. At the national level, the first step towards redressing this trend would be to stop the continuous extension to the scope of intellectual property rights, in particular in copyright. IP maximalism has been given too much time to reign, and it is time to give the revisionists a go.

The international agenda with regards to developing countries will be discussed next.

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[328] Alford, W. P. "Making the World Safe For What? Intellectual Property, Human Rights, and Foreign Economic Policy in the Post-European Cold War", *N.Y.U. Journal of International Law & Policy*, 29, 1997, p.136.

[329] http://www.globalideasbank.org

[330] http://promo.net/pg

[331] http://www.commonsgroup.com

Chapter 4. Intellectual property and developing countries

> *"Intellectual property rights have to do with protectionism. The U.S., and in fact the rich countries generally, have led the insistence that the GATT agreement, like NAFTA, include strong intellectual property rights. That's protectionism. That means increasing the power of patents. Patents are protectionist devices. They are designed to insure that the technology of the future is in the hands of transnational corporations, most of which, incidentally, you guys pay for. Remember they don't believe in a free market. They want to be publicly subsidized in research and development and controlled markets and so on. The strength of intellectual property rights means longer patents."*
> ***Noam Chomsky***

The intellectual property system is here to stay, as it is unlikely that any sort of reform will take place in the foreseeable future. This protection system is on the increase, not only in length of protection, but also geographically and in the amount of rights awarded to owners. How then does this system affect the acquisition of technology by developing countries? This is not just an academic question. A strong international system of intellectual property could be considered a negative for developing countries because one could argue that it makes technology more difficult to come by. If developing countries rely on this initial acquisition of high technologies, then who owns it, and how, becomes of critical significance for their development prospects. Some may argue that less developed countries have a lot to lose and not a lot to gain from implementing the Western model of intellectual property.[332] Is this correct?

1. Intellectual property in the global village

1.1 Trends of protection

Perhaps it could be considered an overstatement to emphasise that the ownership of technology is well covered by national intellectual property legislation in developed nations. Nevertheless, the trends of national protection become crucial to the study of its effect to developing countries because those trends are being exported to developing countries.

National protection of ideas is on the increase. Perhaps one of the best examples of this trend is to chart the gradual extension of copyright terms at national level. To illustrate this point, the Statute of Anne gave authors a copyright that lasted 21 years after the first publication of the

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[332] For example, see: Story, A. "Burn Berne: Why the Leading International Copyright Convention Must Be Repealed", *Houston Law Review*, Vol.40, No.3, 2003, pp.763-801.

work.[333] Later, the Copyright Act of 1814 increased the term to 28 years after publication. In 1842 the term was increased to the lifetime of the author plus seven years, or 42 years after first publication, whichever was longer.[334] The French Declaration of the Rights of Genius of 1873, allowed for copyright protection to last for the lifetime of the author plus ten years after their death.[335] But the most influential determination for the extension of copyright terms took place with the Berne Convention. After the first revision to the Convention, which took place in Berlin in 1908, the minimum term of copyright for which signatory countries should allow was extended to the lifetime of the author plus 50 years, which remains in the latest revisions to the text. The United Kingdom followed suit and enhanced the protection with a new Act of Parliament in 1911.[336]

The European Union, in an attempt to harmonise the various copyright terms amongst its member states, increased yet again the term of copyright from 50 years to 70 years after the death of the author with the approval in 1993 of the Copyright Duration Directive, implemented in the UK in 1995.[337] This Directive was the direct result of the enormous economic interests at stake, and of the considerable lobbying power of the copyright owner industries, as most of the countries in the European Union had maintained the Berne Convention's copyright term of the lifetime of the author plus 50 years.[338] It would have been logical to maintain this term as a minimum, and to allow for the countries with longer terms to continue doing so. These increases have spread further than the European borders. In the United States, the original period of protection was for 14 years, and was later amended to 28 years. Although the US did not sign the Berne Convention until 1988, it did extend the term of copyright to fit with that of this treaty in 1976, and followed suit and implemented the new European standard with the Sonny Bono Copyright Term Extension Act.[339]

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[333] Deazley, *On the origin of the right to copy: charting the movement of copyright law*, op cit; p.33.

[334] Coyle, M. *The History of copyright*, Lawdit Solicitors, 2000. http://www.lawdit.co.uk/archive/The_History_of_Copyright.htm

[335] Walker, *Heirs of the Enlightenment,* op cit.

[336] Coyle, op cit.

[337] Duration of Copyright and Rights in Performances Regulations 1995, Statutory Instrument 3297/95.

[338] Giavarra, E. *Copyright, Libraries and the Digital Environment*, ECUP, 1999. http://www.eblida.org/ecup/docs/fi_reannex10.htm

[339] Walker, op cit.

This serves to demonstrate that the national trends towards more protection are generally translated into international protection, and developing countries are being encouraged to implement the idea of intellectual property prevalent in the West.

1.2 A Western institution?

It is relevant to the question of whether developing countries should adopt the Western system of intellectual property, to analyse whether this concept is endemic to Western values, and whether it goes against customary cultural practices in other parts of the world.

In general, it could be argued successfully that modern intellectual property is indeed a Western concept, developed from the requirements of mercantilist Britain in response to the growing proprietary and private ownership concepts in vogue in the 18th century. Charting the evolution of intellectual property in Europe, one can soon notice how the international development of the protection of ideas has spread from industrialised nations, a process that has been accelerating with the growing process of globalisation and the increase in international trade.

There is some evidence that points towards the finding that the modern international intellectual property system is indeed alien to many cultures, and not only that, some even argue that the whole modern concept of human inventiveness and creativity is slanted towards a Eurocentric view, where cultural expressions and ideas do not necessitate protection unless they are part of a Western product. An interesting case is put forward by Rosemary Coombe, who explains that Art and Culture (capitalised nouns) as we know them today are the result of 19th century colonial expansion, and therefore alien to a wider and more inclusive way of viewing intellectual creations. She says that the system of authorship inherent to the Western intellectual property system only serves to "*culturally impoverish the West*", while alienating the rest of the world.[340]

Historically, China presents a great example of a millenary culture where intellectual property would seem to clash with traditional methods of intellectual dissemination. Some authors have pointed out that there is evidence that the Chinese culture was slanted towards collective attribution of creativity and widespread sharing of knowledge, at least in the elite classes.[341] It has been noted that the Chinese first developed black powder, paper, the printing press, matches

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[340] Coombe, *The Cultural Life of Intellectual Properties*, op cit; p.226.

[341] For a concise treatment of the subject of intellectual property in ancient China, see: Alford, W. P. "Don't Stop Thinking About . . . Yesterday: Why There was No Indigenous Counterpart to Intellectual Property Law in Imperial China", *Journal of Chinese Law* Vol.7, 1993, p.3.

and the compass, technologies that were later adopted by Western nations. It could be argued that if China had first developed intellectual property, perhaps these inventions would have been translated into an Industrial Revolution, but it is difficult to assert this categorically. The historical fact remains that Chinese society favoured sharing of knowledge.

Ideas are non-proprietary in many other societies. Joost Smiers points out that in artistic expressions for example, the trend in many parts of the world tends to be towards communal efforts. He gives the example of many sorts of musical expressions, for example, raï, calypso, reggae, samba, and African music, which rely heavily on borrowed elements, and where performers are free to add on to existing tunes as part of the creative process. Smiers also points out that Japanese culture tends to regard claims of individual ownership of ideas as "*dishonourable or undignified*".[342] Several other examples of communal "ownership" over intellectual creations are found in Australian aboriginal societies, where paintings, oral traditions, medicinal remedies and other artistic methodologies are not to be subject to individual ownership, but are the result of a complex system of tradition, transmission and sacred meaning that place all of these results of the human psyche beyond the traditional Western ideas of property – a conflict that has been making itself felt in Australian courts.[343]

In an unprecedented meeting of intellectual property experts in areas as diverse as law, anthropology, information technology, biology, and the arts, several experts in intellectual property issued the Bellagio Declaration, which recognises the Western centrism of existing protection of ideas. The Declaration concludes that "*in an era in which information is among the most precious of all resources, intellectual property rights cannot be framed by the few to be applied to the many. They cannot be framed on assumptions that disproportionately exclude the contributions of important parts of the world community*."[344]

The pervasiveness of illegal copying of works in many parts of the world would seem to support the view that intellectual property is a system alien to many cultures. Global software piracy figures would seem to indicate that the illegal copying of software is concentrated in the Asia/Pacific region, with losses in revenue calculated at $4.75 billion USD.[345] Another report

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[342] Smiers, J. "The abolition of copyrights: better for artists, Third World countries and the public domain", Copyright *in the Cultural Industries*, Towse, R. ed; Cheltenham: Edward Elgar Publishing, 2002, p.126-128.

[343] For more on the subject of the legal conflicts in Australia regarding intellectual property, see: Gibson, J. "The Cultural Diversity in Biodiversity: The Protection of indigenous Cultural and Intellectual Resources in a Global Context", *Situation Analysis*, March 2003, pp.46-61.

[344] *The Bellagio Declaration*, op cit.

[345] Business Software Alliance. *Piracy Study 2002*, June 2002. http://www.bsa.org/resources/2002-06-10.130.pdf

by the Interactive Digital Software Association (IDSA) identified Taiwan, South Korea, Thailand, the Philippines, and Malaysia as the major copiers of computer and video games around the globe.[346] Music piracy runs rampant in Latin America, where more than 50% of music sales are of pirated copies in most countries.[347]

1.3 Globalisation

The Western institution of intellectual property cannot be divorced from the modern concepts of globalisation and international trade. The reason for this is that as international commerce between nations increases, developed nations will be interested in making sure that the proprietary protection of technologies that they have enacted within their countries applies as well when exporting those technologies around the world.

The general understanding of the meaning of globalisation is that it is a process in which the world is moving from a system of national economies into a trade regime where barriers of different types are disappearing to create one global marketplace.[348] It is believed that this process of globalisation is being driven by the fall of trade and investment barriers, the rapid technological advance in transportation and telecommunications, and the increase in direct investment of companies into third markets.[349]

A symposium held by the OECD has stated that globalisation is not an isolated phenomenon, but it is the latest stage in the development of the international economy. The OECD Industry Committee established that the characteristics of globalisation are:

> *"- The organisation of production on an international scale, enabling firms to establish a presence in major foreign markets, gain efficiencies and customise products for local markets.*
> *- The acquisition of inputs and supporting services from around the world, enabling firms to exploit the specialisation of many countries and minimise costs.*
> *- The formation of cross border alliances and joint ventures with other companies, enabling firms to combine assets, share costs and enter new markets."*[350]

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[346] Burke, K. *IDSA Reports Continued Global Piracy Losses*, February 16, 2001. http://www.idsa.com/releases/2_16_2001.html

[347] International Federation of the Phonographic Industry (IFPI). *Music Piracy Report 2002*. http://www.ifpi.org/site-content/antipiracy/piracy2002.html

[348] Hill, C. *International Business: Competing in the Global Marketplace*, 2nd Edition, Boston MA: Irwin Publishers, 1997, p.5.

[349] Ibid, pp. 7-14.

[350] OECD, as cited by: Wes, M. *Globalisation: winners and losers*. London, Institute for Public Policy Research, 1996, p.3.

It can be stated that this globalisation trend means that enterprises are crossing borders more frequently when investing; precisely what makes them into multinational corporations. Globalisation is a process that encourages the use of local labour, local enterprises and local expertise in order to maximise efficiency and reduce costs, which implies a certain degree of cooperation between the multinational corporation and the recipient country.[351] One could argue that this would be welcomed by developing countries, as those partnerships would allow some sort of transfer of technology to take place, as expressed earlier. However, enterprises that rely heavily in the protection awarded to their technology have it in their best interest to make sure that their intellectual property will also be protected wherever they invest because staying ahead in the highly competitive information markets requires a lot of investment.

It seems like the present push towards globalisation is not going to slow down, and it is actually speeding up as more trading barriers fall down. Moreover, international organisations such as the WTO are very sympathetic to the opening of markets and the increase in international trade.

It is easy to see why developed countries are pushing for a stronger international regime of intellectual property. If globalisation is a process of capitalism directed towards the opening of trade borders in search of new markets and resources, then it also must be understood that globalisation is expansionist by nature. One of the results of such expansionism is the exportation of all systems that assist globalisation.[352] This is translated often into the installation of financial and structural reforms in developing countries to "modernise" their economies by means of privatisation and opening of trade barriers. The implementation of legal institutions that assist globalisation will also be a priority, particularly for countries that do not have any of those systems in place, or have inadequate versions of the legislations in place in the West. This is particularly important with regards to the protection of intellectual products. Bettig comments: "*Given the expansionary logic of capital, it is 'natural' that existing and emerging forms of human artistic and intellectual creativity increasingly are being integrated into the global market system*."[353]

The end result of the relentless globalisation process is the generation of a North–South trade route, which includes the trade of culture, knowledge and technology. However, this is a

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[351] For a look at the effect of the global economy with emphasis in the labour markets, see: Klein, N. *No Logo*, London: Flamingo, 2000.

[352] For more about the export of globalisation ideals, see: Stiglitz, J. *Globalization and Its Discontents,* New York: W.W. Norton & Company, 2003.

[353] Bettig, *Copyrighting Culture: The political economy of Intellectual Property*. op cit.

disproportionate and one-sided trade of ideas because developed countries receive intellectual products for free, while exporting technology at the highest price. Boyle expresses this process by noting that:

> *"The author concept stands as a gate through which one must pass in order to acquire intellectual property rights. At the moment, this is a gate that tends disproportionally to favor the developed countries' contributions to world science and culture. Curare, batik, myths, and the dance 'lambada' flow out of the developing countries, unprotected by intellectual property rights, while Prozac, Levis, Grisham, and the movie Lambada! flow in--protected by a suite of intellectual property law, which in turn are backed by the threat of trade sanctions."*[354]

It is this sense of isolation in the decision making process which makes the implementation of intellectual property protection in the developing world such a difficult task. It has to be said that there is no single solution within an intellectual property model. The assumption that the Western model is the only appropriate way to protect intellectual creations fails to recognise the many viable alternatives to be found in other cultural systems of ownership.

2. Intellectual property and development

2.1 The imitation dilemma revisited

The trend towards globalisation and the exportation of stronger intellectual property systems to developing countries protection seems to be unstoppable. One could assume that all of this protection should have a detrimental effect on developing countries because technology will be more expensive and difficult to acquire without infringing on the owner's rights. Is this an accurate assumption?

It has already been discussed that imitation of technology existed long before the creation of intellectual property models and that imitation is one of the most important vehicles of technological advancement, and perhaps even of development.

There appears to be plenty of evidence showing that when a country is in its developing stages, the emphasis on the protection of intellectual creations seems to be of secondary concern. Examples like these abound in the annals of the dawn of the Industrial Revolution, where the transfer of industrial technology from Britain was done by hiring skilled British workers in an effort to overcome some of the early patent restrictions, so much was done in this way that the

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[354] Boyle, J. *Shamans, Software, and Spleens: Law and the Construction of the Information Society*, op cit, p.125.

British government had to ban skilled worker migration.[355] In fact, the UNDP remarks that "*…many of today's advanced economies refused to grant patents throughout the 19th and early 20th centuries, or found legal and illegal ways of circumventing them*."[356]

In the same line, Muchlinski points out that the developed world currently places a much larger emphasis on intellectual property rights than they did when they were becoming industrialised, which may account for the speed with which the development took place.[357] This phenomenon may be an indication that developed countries have facilitated their own technological development by protecting their markets from external patent suits against companies that are imitating the inventions of others. An example of this is that of Switzerland, home of some of the largest pharmaceutical companies in Europe, which did not even recognise product patents until 1977.[358]

Another example can be found in the development of intellectual property protection in the United States. Although from the start it inherited some of the economic justifications for the existence of intellectual property from Europe, the United States has been remarkably reticent, until recently, to advocate for international intellectual property. The main example of this can be seen from the early stages of international protection prior to the Paris and Berne Conventions. Copyright expert, Siva Vaidhanyanathan, points out that the attitude of the American publishing industry for most of the 19th century was one of carefree copying of European works, going as far as not signing a bilateral copyright protection treaty with Britain as it would mean that American authors would not be able to obtain cheap British books. The reason for this is that it was widely believed that cheap books would help on the literacy efforts in the American frontier.[359]

This carefree atmosphere would eventually change on the domestic front. In 1906, Mark Twain delivered a moving speech to the joint Committee of Patents in the American Congress, asking for stronger legislation to protect the rights of authors. This plea eventually led to stronger local protection with a new copyright bill that was passed in 1909, and would remain in effect for almost 70 years. Mark Twain had become involved in the copyright debate after witnessing his

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[355] UNDP. *Human Development Report 2001*, op cit, pp.102-104.

[356] Ibid, p.102.

[357] Muchlinski, *Multinational Corporations and the Law*, op cit, p.438.

[358] Kumar, V. *Intellectual Property Rights - An Obstacle to Development?* Winner of the Intellectual Property Counter essay contest, April 26, 2002. http://www.wipout.net/essays/0314kumar.htm

[359] Vaidhyanathan, *Copyrights and Copywrongs,* op cit; pp.36-37.

works being pirated in Canada and Europe, and not being paid a penny for his published works in those countries. Despite his efforts, he was not able to convince the United States Congress to join the Berne Convention.[360] As noted in West's Encyclopaedia of American Law:

> *"Influenced greatly by its early status as a net importer of copyrighted materials, the United States resisted joining the Berne Convention for over a century. Adherence to the treaty's conventions would have required U.S. publishers of foreign works---many of whom produced pirated copies---to pay royalties and fees to foreign copyright holders, thus causing a significant amount of money to go overseas. However, by the end of World War II, the United States had become a major exporter of copyrighted materials, and it became clear that it would be to the country's economic advantage if its own authors and copyright holders could be assured of receiving royalties from overseas publishing."*[361]

This led the United States to eventually join the Berne Convention, and it also prompted its ultimate change of heart towards international intellectual property, to the point that it has now become one of the most outspoken proponents of stronger international regulation, as is evident from the vast lobbying performed by the United States government and intellectual property industries during the negotiations of international agreements.[362]

If intellectual property was neglected during the early stages of development of the West, the same applies in modern times with some developing countries that have become technologically self-sufficient. In recent years, some of the countries in South East Asia started to experience considerable signs of industrialisation due to the manufacture of high-technology products. The UK's Commission on Intellectual Property Rights Report points out that:

> *"…the best examples in the recent history of development are the countries in East Asia which used weak forms of IP protection tailored to their particular circumstances at that stage of their development. Throughout the critical phase of rapid growth in Taiwan and Korea between 1960 and 1980, during which their economies were transformed, both countries emphasised the importance of imitation and reverse engineering as an important element in developing their indigenous technological and innovative capacity."*[363]

From the examples of the early reliance in imitation, one could conclude that there is a dichotomy between two different aspects of technological advance between innovation and imitation. In countries where innovation is considered as the tool for development, strong

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[360] Ibid; pp.35-36.

[361] "Copyright, International", *West's Encyclopaedia of American Law*, op cit.

[362] Hutton, W. *The World we are in*, London: Little Brown, 2002, p.203.

[363] Commission on Intellectual Property Rights. *Integrating Intellectual Property Rights and Development Policy*, Report of the Commission on Intellectual Property Rights, September 2002, p.20.

protection is likely to be favoured (i.e., the United States and Europe). In countries where imitation of technology is considered as the vehicle for development, intellectual property protection will not be a priority (i.e., Southeast Asia).[364]

The examples shown above certainly point towards the existence of a double standard when it comes to the innovation and imitation dichotomy. It would appear that countries will desire to favour imitation while being in the technological development stages, but once that position has been attained, then the emphasis will come in attempting to protect that technology by advocating for stronger mechanisms to shield that technology from being imitated by others.

2.2 Implications of technological ownership for the developing world

The implications for the developing world of stronger international protection of intellectual property start becoming clearer. Developing countries cannot hope to generate their own technology right away, so they must acquire high technology from developed countries. One of the problems is that the richest Western countries largely own technology in the form of copyrights and patents. For example, of the global number of patents, developing countries own only 5%, and if the largest developing countries such as Brazil and India are taken from the equation, the number drops to an astounding 1%.[365] Therefore, wherever this technology is owned, it costs money to obtain a licence to use it from the owner, and in many instances, large amounts of money. Because of these reasons, it would be fair to assume that stronger international intellectual property protection may hinder development, because intellectual property related industries have large and fast growing economic power. With such large amounts of money at stake, it should come as no surprise that the pressure to increase international protection of technology is not likely to stop.

This problem has been recognised by government agencies, international organisations, non-governmental organizations (NGOs) and many other pressure groups. For example, the subject was discussed during an UNCTAD seminar that took place in Moscow in 1990; the participants stated, "*It is likely that in the 1990s the implications of intellectual property rights in technology transfer will assume a considerably enhanced role*".[366] The issue of development and intellectual property was also brought up in the United Nations Commission on Sustainable

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[364] Trebilcock, M. J. and Howse, R. *The regulation of International Trade*, London: Routledge, 1997. p.252.

[365] Kumar, op cit.

[366] UNCTAD. *Technology transfer and development in a changing international environment: policy challenges and options for cooperation*. Moscow, February 1990. Materials and recommendations of a Seminar for Developing countries of Asia, p.145.

Development. During a meeting that took place in 1998, there was a heated debate between representatives from developed and developing countries. Representatives of some countries with less economic power, in particular the Chinese, expressed that although intellectual property protection is important, too much defence might hinder technology development efforts, thus creating a problem for fair development. The United States representative argued that intellectual property protection did not damage developing countries, maintaining that strengthening their observance will promote development by promoting foreign investment.[367]

The claims made by the American representative to this Commission are not isolated; they seem to be part of the pitch with which the developed world is selling the strong regime of international protection to the developing world.[368] Nevertheless, it should be noted that arguments in favour of the international regime of intellectual property have also been put forward by representatives of some poor nations. For example, the Chief State attorney of the African nation of Ghana has expressed that there are several advantages for the developing world in passing stronger intellectual property legislation. She says that increased enforcement of intellectual property will encourage invention and creativity, attract foreign investment, help to protect emerging technologies, and facilitate new development infrastructure.[369]

Besides the suggested advantages for the poorer nations, some countries have decided to use the "big stick" approach by threatening to use their economic might against countries that do not meet the Western standards of intellectual property protection, mostly in the shape of trade sanctions. The United States for example, has in place several provisions established in Section 301 of the 1974 Trade Act, and the subsequent awarding of Special 301 status to countries, implemented in 1988. This statute is explained like this:

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[367] Commission on Sustainable Development. *Impact of intellectual property laws on technology transfers considered by Commission on Sustainable Development*, Press Release ENV/DEV/471, April 23, 1998. http://www.un.org/search

[368] Examples of this abound. Just for another corroboration see: Lehman, B. A. *Support for economic and political freedom*. http://usinfo.state.gov/products/pubs/intelprp/support.htm

[369] Mould-Iddrisu, B. *Intellectual Property Rights: A developing country's perspective*. http://usinfo.state.gov/products/pubs/intelprp/perspect.htm. However, one should note that this commentary is published by the US Government.

> *"Special 301 requires the U.S. Trade Representative to identify those countries that deny adequate and effective protection for intellectual property rights or deny fair and equitable market access for persons that rely on intellectual property protection. Countries which have the most onerous or egregious acts, policies or practices and which have the greatest adverse impact on relevant U.S. products must be designated "Priority Foreign Countries," and at the end of an ensuing investigation, risk having trade sanctions levied against them. Countries can also be placed on other lists which do not result in immediate trade sanctions, such as 'Priority Watch List' and 'Watch List'."*[370]

Some other developed countries, particularly in Europe, are trying to take a look at this problem with a less aggressive outlook. The United Kingdom, for example, has created a Commission on Intellectual Property Rights (CIPR), which is part of the Department for International Development. Although the Commission still insists on linking adequate intellectual property with foreign investment, and urges less developed countries to implement domestic intellectual property legislation, it has a more realistic and understanding approach to the problems that such protection may have on development.[371]

Some NGOs agree with some of the expressed views that minimum standards of international intellectual property protection should be taken up by the developing world, but at the same time they argue that stronger protection may hinder development. In a paper by the charity organisation Oxfam, several problems that may emerge from stronger protection have been identified and enumerated. They believe that the new international regime of strong intellectual property protection will have the following effects:

a) It will exclude poor countries from access to vital technologies, such as medicines, new seeds, software, educational materials and other intellectual creations due to high cost of acquisition.

b) It will increase the already existing technology gap between rich and poor countries.

c) It will increase the cost of technology imports by forcing licensing of intellectual creations.

d) It will encourage a direction of research and development towards the rich economies and away from the research needs of poor countries, as that sort of research is more profitable.[372]

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[370] International Intellectual Property Alliance. *Copyright and Trade issues*. http://www.iipa.com/copyrighttrade_issues.html

[371] Commission on Intellectual Property Rights. *What is the Commission on Intellectual Property Rights?* 2002. http://www.iprcommission.org/whatis.asp

[372] Oxfam. *Intellectual Property and the Knowledge Gap.* op cit.

Despite all of these disheartening implications of intellectual property, developing countries still need the system as there are no viable alternatives to this system of protection. Ways of working with the existing framework must then be found. Perhaps the solution can be found in the same agreements that are being used to increase international protection of intellectual creations.

3. TRIPS

The TRIPS agreement is the most important developments for international intellectual property since the adoption of the Berne and Paris Conventions in the 19th century. This is because this is an agreement that regulates the international trade of intellectual creations within the larger issue of globalisation. Although there are many other treaties and agreements that regulate international intellectual property, this work will concentrate on the TRIPS agreement because the issue of the transfer of technology to developing countries is ultimately a matter of trade.

3.1 Brief introduction to TRIPS

As it can be gleaned from its very name, the 1995 TRIPS agreement is the international treaty that handles the international trade issues that arise from intellectual property protection. TRIPS was one of the results of the long Uruguay Round of the General Agreement on Tariffs and Trade (GATT), a process that had its origins in the end of the Second World War, and included lengthy discussions that would eventually end up in the framework that created the WTO. The agreement provides a comprehensive set of rules that signatory states should implement in their national legislations in a wide range of issues, including copyright, patents, trademarks, designs, geographical indications and undisclosed information.[373] The goal of the agreement is to "*reduce distortions and impediments to international trade, and taking into account the need to promote effective and adequate protection of intellectual property rights, and to ensure that measures and procedures to enforce intellectual property rights do not themselves become barriers to legitimate trade*."[374]

There are three main features in which the agreement attempts to reach the goal of establishing trading rules that apply to international intellectual property protection:

a) **Standards:** The treaty tries to establish minimum standards of protection in each area of intellectual property for the member states. As stated by the WTO:

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[373] Gervais, D. *The TRIPS Agreement: Drafting History and Analysis*, 2nd Edition, London: Sweet & Maxwell, 2003.

[374] TRIPS, Preamble.

> *"Each of the main elements of protection is defined, namely the subject-matter to be protected, the rights to be conferred and permissible exceptions to those rights, and the minimum duration of protection. The Agreement sets these standards by requiring, first, that the substantive obligations of the main conventions of the WIPO, the Paris Convention for the Protection of Industrial Property (Paris Convention) and the Berne Convention for the Protection of Literary and Artistic Works (Berne Convention) in their most recent versions, must be complied with."*[375]

b) **Enforcement:** The treaty sets minimum standards of domestic procedures and remedies, allowing for protection for foreign nationals in each of the member states. It also contains "*provisions on civil and administrative procedures and remedies, provisional measures, special requirements related to border measures and criminal procedures, which specify, in a certain amount of detail, the procedures and remedies that must be available so that right holders can effectively enforce their rights*."[376]

c) **Dispute settlement:** TRIPS uses the multilateral dispute settlement mechanisms established by the WTO to resolve conflicts between signatory states.[377] This dispute resolution is set out in articles XII and XIII of the 1994 GATT agreement.

3.2 Relevant provisions and concepts in TRIPS

There are several important provisions and principles in TRIPS that are of particular interest to developing countries. These are:

3.2.1 Exhaustion and parallel imports

Exhaustion is a legal concept that states that once a product is sold that is subject to intellectual property protection, the owner cannot prohibit the subsequent resale of the product as rights to that product are said to have been "exhausted" by the first sale.[378] It must be pointed out that the rights can only be exhausted only with respect to the market of which the goods were put, so the concept of exhaustion will change in application from one country to the other because it will all depend on the concept of market that is being used. For example, the European Union is a single a market, which means that exhaustion applies throughout the entire EU. Other legislations recognise only national exhaustion because they recognise their own country as the

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[375] WTO. *Overview: the TRIPS Agreement*. http://www.wto.org/english/tratop_e/trips_e/intel2_e.htm

[376] Ibid.

[377] Ibid.

[378] ICC. *Exhaustion of intellectual property rights*. Policy Statement by the Commission on Intellectual and Industrial Property, 7 January 2000.

single market. International exhaustion would eventually mean that the rights are exhausted by being placed anywhere in the world.[379]

TRIPS deals with exhaustion in a curious way. Article 6 mentions exhaustion only to say that exhaustion will not be covered by the dispute settlement mechanisms. This is curious because it simply refuses to make a statement about the national or international exhaustion of rights for all practical purposes; this is because no country can be brought to the WTO dispute resolution for an exhaustion matter, which leaves it unregulated for all practical purposes.[380]

The importance of exhaustion for developing countries is that it is closely related to the concept of parallel imports. Parallel imports are the result of the disparity in prices between economies around the world. Some items tend to be offered in developing countries cheaper than in developed nations because of the disparity of acquisitive power. This disparity encourages the application of a policy of parallel importation. The concept of parallel importation is explained eloquently by Rigamonti:

> *"In some industries, the global distribution of goods is accomplished through systems of distributors carefully selected by the producers of these goods. The distributors are generally exclusively authorized to distribute the respective goods within a certain territory. The selective distribution system enables the producer of the distributed goods to control the distribution, to minimize intra-brand competition, and to charge different prices in different territories. If the prices vary too much between different territories, however, there may be competitors outside the selective distribution system trying to exploit the price differences by buying the goods from an authorized distributor in a "cheap" territory and subsequently selling them to consumers residing in an "expensive" territory at a price slightly beneath the price charged by the authorized distributor in said "expensive" territory. This business practice relies on so-called "parallel imports"."*[381]

Intellectual property owners do not favour parallel imports because usually they would like to control the markets in which they place their products. When a country is importing an article from another market, in which it is offered at a much cheaper price than that offered by the company in the domestic market, the company will lose profits.

This is where exhaustion comes in. If the intellectual property rights of a product are exhausted internationally, then the item can be resold anywhere in the world. On the other hand, if the

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[379] Gold, T. *Parallel imports and the exhaustion of rights: the world focus*, 1999. http://www.shlegal.com/docs/parallelimports.pdf

[380] Gervais, op cit, pp.112-114.

[381] Rigamonti, C. "Parallel Imports in Switzerland", *Jurist*, January 25, 2002. http://jurist.law.pitt.edu/world/swisscor6.htm

exhaustion is national, then the owner can continue to impose restrictions on the distribution of these items. This is particularly relevant in some technologies, such as pharmaceuticals.

3.2.2 Compulsory licences

Intellectual property rights under TRIPS are not absolute, particularly in patents. In most countries, there are some situations in which the patent owner will be forced to provide a licence to a third parties to exploit the patented invention in a specific way. These are known as compulsory licences, and they are dealt Article 31 of TRIPS. This article explains that member states should grant compulsory licences when there is overriding necessity because of an emergency that calls for the granting of a licence to use the technology. Other reasons to allow compulsory licences are a refusal to deal from the owner, the existence of anti-competitive practices from the owner, or for non-commercial purposes. However, TRIPS allows countries to provide compulsory licences for other reasons because this list is not exhaustive.[382]

It must be pointed out that the compulsory licences granted through this mechanism are limited to a severe regime of restrictions. The licence should not be granted without first consulting with the owner, and then adequate compensation should be given. Another important restriction is that the licence can only be used in the domestic market where it was granted, and the use of patented materials will be subject to judicial review.

The importance of compulsory licences for developing countries is evident, as it allows them to be able to licence some technologies under specific conditions, which could become extremely useful in cases of requiring access to specific technologies that are of greatest importance, such as could be the case for pharmaceuticals.

3.2.3 Technology transfer under TRIPS

The TRIPS agreement contains particular mandates for technology transfer and technical cooperation between the developed signatory members and developing nations. The issue of technology transfer is first introduced in TRIPS as a principle in Article 8.2 It reads:

> *"Appropriate measures, provided that they are consistent with the provisions of this Agreement, may be needed to prevent the abuse of intellectual property rights by right holders or the resort to practices which unreasonably restrain trade or adversely affect the international transfer of technology."*

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[382] Correa, C. *Intellectual Property Rights, the WTO and Developing Countries: The TRIPS Agreement and Policy Options for Developing Countries*, London: Zed Books, 2000, pp.89-92.

This is an encouraging principle and a welcome addition to TRIPS. It is further expanded through Article 66.2, which reads:

> *"Developed country Members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed country Members in order to enable them to create a sound and viable technological base."*[383]

Another important tool is provided in article 67, which encourages developed countries to provide technical assistance to developing countries when drafting new intellectual property rights legislation.

3.2.4 Transitional arrangements

Under Article 66.1, Least Developed Countries are allowed an extended period to implement the agreement. The reason for this was that it was considered that "*In view of the special needs and requirements of least-developed country Members, their economic, financial and administrative constraints, and their need for flexibility to create a viable technological base…*"[384] This meant that LDCs had the opportunity to implement TRIPS until January 1, 2006, with the possibility that the Council for TRIPS could extend the dates, which has happened with regards to pharmaceuticals, which will be explained in more detail later.

3.3 Effect of TRIPS on developing countries

It could be said that TRIPS is an agreement is of particular importance to developing countries because it serves as another mechanism that furthers the imposition of the Western intellectual property system onto developing countries. However, it is fair to say that TRIPS goes to great lengths to try to accommodate the needs of developing countries, particularly with regards to LDCs. This is because although TRIPS offers a comprehensive set of obligations to signatory states, there are some issues in which developing countries have been awarded some leniency, or that are not specifically covered by the agreement, therefore offering developing countries more room to exercise with regards to the protection of intellectual works. Correa recognises this when he comments that "*this Agreement contains elements that, duly applied, may permit a certain balance in its implementation*."[385] The WTO is keen to make sure that this idea of the

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[383] TRIPS, Art. 66.2.

[384] TRIPS, Art. 66.1.

[385] Correa, op cit, p.6.

Agreement as a provider of benefits and opportunities for developing countries is maintained. In the words of Mike Moore, director of the WTO:

> *The WTO's TRIPS Agreement plays a vital role in tackling these problems. It strikes a carefully-negotiated balance between providing intellectual property protection – which is essential if new medicines and treatments are to be developed – and allowing countries the flexibility to ensure that treatments reach the world's poorest and most vulnerable people.*[386]

However, the full implementation of the TRIPS agreement has some implications that could still affect developing countries, even if it is conceded that it contains several attempts to balance the needs of developing nations.

One of the goals of the TRIPS agreement is to establish a wide-ranging international intellectual property protection system by requiring every member of the WTO to implement a series of measures in the form of national legislation that will provide adequate protection of ideas all around the world. The most important part of TRIPS that relates to technology is the setting up of a strict system of international patent protection. Article 27.1 states that:

> *"The TRIPS Agreement requires Member countries to make patents available for any inventions, whether products or processes, in all fields of technology without discrimination, subject to the normal tests of novelty, inventiveness and industrial applicability. It is also required that patents be available and patent rights enjoyable without discrimination as to the place of invention and whether products are imported or locally produced."*[387]

This means that all member states will have to allow patents that are recognised by other members, while allowing exceptions on the areas of morality, medical treatments or biological organisms.

The end result of the international strengthening of patent rights and other technology protection is that TRIPS serves to ensure a steady income of intellectual property related revenue for those countries that own a large percentage of patents of high technology. The relevant claims that there are some concessions to developing countries should be met with scepticism if we notice that even with extended terms to implement changes in their legislation; developing countries have not been able to acquire technology before those deadlines are met. Drahos in particular presents the burning question of why have developing countries signed up to an agreement that

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[386] WTO. *Quotes on Intellectual Property Rights*. June 22, 2001. http://www.wto.org/trade_resources/quotes/trips/patents.htm

[387] WTO. Overview: *The TRIPS Agreement*, op cit.

benefits exporters of intellectual works and not importers. He mentions that the clue is the negotiation process:

> *"Put starkly, the intellectual property regime we have today largely represents a failure of democratic processes, both nationally and internationally. A small number of US companies which were established players in the knowledge game captured the US trade-agenda-setting process and then, in partnership with European and Japanese multinationals, drafted intellectual property principles that became the blueprint to TRIPS. The resistance by developing countries was crushed through trade power."*[388]

However, the WTO still claims that there are adequate provisions that will allow developing countries more leeway when attempting to obtain technology, but these could be considered a cosmetic attempt at appeasing the developing countries. The main way in which this is achieved is stated in Article 8 of the Agreement, where two principles are established. The first principle says that the member states may formulate special protection in areas such as public health, nutrition or other public interest issues, as long as these special areas of protection are consistent with the Agreement. The second principle states that special provisions may be used in cases in which a right owner is unreasonably restricting access to technology, as has already been covered. The problem with these principles – and in particular with the first one – is that it appears to be a resort to circular reasoning. Member states will be able to impose some provision that will protect public interest technologies, but only if they are not against the provisions of the Agreement. The Agreement itself is very specific, however, so it may be difficult to find a situation in which this principle would apply without going against any of the existing provisions contained within it. Another problem may arise when trying to analyse what exactly constitutes an unreasonable access to technology. It could be argued that the patent system itself is an attempt to do exactly that.

4. TRIPS after the WTO Doha Ministerial Declaration

4.1 The Doha Process

As originally framed, the international system of intellectual property protection embodied by the TRIPS agreement seems to be slanted towards the owners of technology despite some of the concessions to developing countries. Most of the concerns expressed by the developing world were not addressed in the original text of the treaty. Since its implementation, TRIPS has been gathering growing criticism regarding the problems imposed by increasing intellectual property

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[388] Drahos and Braithwaite, *Information Feudalism*, op cit, p.12.

protection in LDCs. The most important concern is the access to certain types of basic technologies.

Although the specific issue of intellectual property and pharmaceuticals falls outside of the scope of this work[389] and is the of a separate document from the WTO Ministers,[390] it is important to consider here some of the growing efforts by the WTO to address these concerns by developing countries in light of the TRIPS agreement and that culminated in some promising changes, particularly spearheaded by the concern about medicines.

An important meeting of the international ministers of the member states took place in Doha, Qatar, in November 2001. Before this meeting, representatives from the Least Developed Countries (LDCs) met in Zanzibar and voiced several concerns regarding aspects of the international trade system, which they felt was marginalizing the poorer sectors of the world's population. One of these concerns centred on the access to essential medicines. The final Zanzibar Declaration states that the LDCs are keen on "*Reaffirming the right to apply the TRIPS Agreement in a way that allows member countries to have easy access to medicines to combat HIV/AIDS, TB, Malaria and other killer diseases*".[391]

Other earlier statements served to underline the importance of health and the implications for developing countries. The European Union presented a paper in June 2001 where it was admitted that health concerns were of importance, although it continued to stress the need for strong levels of international protection. This paper states that:

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[389] For more about this subject, see: Love, J. "Access to medicine and compliance with the WTO TRIPS Accord: Models for State Practice in Developing Countries", *Global Intellectual Property Rights*, Drahos and Mayne, eds. London: Oxfam, pp.74-90; and Alsegård, E. "Global pharmaceutical patents after the Doha Declaration – What lies in the future?", (2004) 1:1 *SCRIPT-ed*, http://www.law.ed.ac.uk/ahrb/script-ed/docs/doha.asp

[390] WTO. *Doha WTO Ministerial Conference: Declaration on the TRIPS agreement and public health*. Fourth WTO Ministerial Conference, Doha, Qatar. 9-14 November, 2001. http://www.wto.org/english/thewto_e/minist_e/min01_e/mindecl_trips_e.htm

[391] Least Developed Countries Trade Ministers. *Draft Zanzibar Declaration*. Meeting of the Ministers Responsible for Trade of the Least Developed Countries. Zanzibar, Tanzania. 22-24 July, 2001. http://www.southcentre.org/info/media/04/04.htm

> *"The TRIPS Agreement has increasingly come under fire for allegedly standing in the way of developing countries' efforts to implement an effective public health policy. The EC and their member States take such criticisms seriously and stand ready to engage in a positive manner in the discussion, leading where necessary to clarification, of certain of the Agreement's provisions [...] However, the TRIPS Agreement cannot be held responsible for the health crisis in developing countries, while it must not stand in the way for action to combat the crisis."*[392]

The reactions of other representatives towards suggestions of softening the implementation schedule of TRIPS were not as lukewarm as that of the EU. The United States delegation presented a paper before the Ministerial meeting to request that TRIPS should remain as it was. Their argument is similar to the line expressed by United States trade representatives to other bodies, such as UNCTAD. They argued that patent protection provides an incentive to investment in developing countries, because patent owners will not invest in a country where they cannot recover the costs of research and development which they have incurred. They also argued that patent owners had to disclose the technical details of their innovation, which ensured the future public benefit.[393]

Despite these concerns, it can be said that the results of the Doha Ministerial meeting were positive towards the developing countries as the discussions went to great lengths to try to address these issues in their entirety. In one of the most important parts of the Declaration, the Ministers state that:

> *"We recognize the particular vulnerability of the least-developed countries and the special structural difficulties they face in the global economy. We are committed to addressing the marginalization of least-developed countries in international trade and to improving their effective participation in the multilateral trading system."*[394]

On a separate declaration, the Ministers go further by listing a series of flexibilities that will be awarded to developing countries regarding medicines and other public health issues.[395] Nevertheless, it can be said that the issues raised by the Doha Declaration are an important step towards assisting the less developed nations in regards to the acquisition of technology, as some

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[392] European Union. *Communication from the European Communities and their member states: The relationship between the provisions of the TRIPS Agreement and access to medicines*, IP/C/W/280, June 12, 2001. http://www.wto.org/english/tratop_e/trips_e/paper_eu_w280_e.htm

[393] *Intervention of the delegation of the United States under item N (Intellectual Property and Access to Medicines) of the agenda of the Council for TRIPS. M*eeting of 18-22 June 2001, JOB(01)/97/Add.5, Council for TRIPS, 28 June 2001.

[394] WTO. *Ministerial Declaration*, WT/MIN(01)/DEC/1, Fourth WTO Ministerial Conference, Doha, Qatar. 9-14 November, 2001. http://www.wto.org/english/thewto_e/minist_e/min01_e/mindecl_e.htm

[395] WTO. *Doha WTO Ministerial Conference: Declaration on the TRIPS agreement and public health,* op. cit.

of the restrictive rules imposed by the international system of protection expressed by TRIPS are loosened somewhat. As expressed by Vandoren:

> *"All interested parties should be happy with the balanced result which meets the long-term interests of all, including the poor populations of the globe. The Declaration provides a delicate balance between the interests of those who had put the relationship between TRIPS and public health on the agenda of the TRIPS Council, and those whose major preoccupation was to safeguard the TRIPS Agreement."*[396]

4.2 Doha and technology transfer

The Doha Ministerial Declaration introduced one of the best options for a broad agreement in regards to the transfer of technology is through the international intellectual property regime. The issue of technology transfer is closely related to intellectual property protection, and any new attempts to try to regulate it will have to deal in one form or another with intellectual property treaties.

The Doha Ministerial Declaration makes a strong call to continue with the regime set out in articles 63 and 66.2. The Declaration recognises the need to encourage the transfer of technology by stating that:

> *"We reaffirm the commitment of developed-country members to provide incentives to their enterprises and institutions to promote and encourage technology transfer to least-developed country members pursuant to Article 66.2."*[397]

As part of the encouraging steps towards a more comprehensive treatment of technology transfer, the Doha process created a Working Group on Trade and Technology Transfer, which was supposed to report back to the WTO in Cancun's Ministerial Conference in 2003. The Working Group started in an encouraging way by issuing a research paper about the state of the art in technology transfer,[398] and by accepting submissions by interested countries, NGOs and other stakeholders. These meetings ended with a report to the Council for TRIPS.[399] While very comprehensive, the report begins to show that there may be some issues of concern that could

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[396] Vandoren, P. "Médicaments sans Frontiéres? Clarification of the Relationship between TRIPS and Public Health resulting from the WTO Doha Ministerial Declaration", *Journal of World Intellectual Property*, Vol.5 No. 1, January 2002, p.11.

[397] WTO. *Doha WTO Ministerial Conference: Declaration on the TRIPS agreement and public health*. Fourth WTO Ministerial Conference, Doha, Qatar. 9-14 November, 2001. http://www.wto.org/english/thewto_e/minist_e/min01_e/mindecl_trips_e.htm

[398] WTO Working Group on Trade and Transfer of Technology. *Trade and Transfer of Technology*, WT/WGTTT/W/1, 2 April 2002.

[399] WTO Working Group on Trade and Transfer of Technology, *Report (2003) of the Working Group on Trade and Transfer of Technology to the General Council,* WT/WGTTT/5, 14 July 2003.

derail the debate in a similar manner to what happened with the UNCTAD TOT Code process. One particular sticking point appears to be the issue of intellectual property. The report mentions that some countries are stating that intellectual property rights are a basic precondition for technology transfer. In particular:

> *"…some other Members believed that a good IPR regime would facilitate the transfer of technology, especially technology otherwise viewed as being sensitive. According to those Members an appropriate IPR regime could play a crucial role in technology transfer as an inducement to direct investment; as a stimulus to innovation; and as a source of inexpensive technological know how."*[400]

Although the developments within this Working Group are encouraging, the failure of the Cancun Ministerial Meeting[401] would seem to indicate that there will probably not be much official action in this area. However, there are some encouraging signs, particularly a recent decision by the Council for TRIPS.[402] This decision decrees that developed countries will have to provide a yearly report about the action taken in order to ensure the encouragement of technology transfer to developing countries. This report will have to contain which regimes are in place to foster technology transfer; which incentives to private industry have been made; which enterprises qualify within their territory; ad statistical data.[403]

Although it can be said that the existence of such rules are encouraging, it must also be said that there is no real evidence that these articles have encouraged any new technology transfer agreements. This is a point well made by the CIPR, which expresses that these articles have not been effective in creating incentives for private enterprises to implement some technology transfer schemes.[404] Nevertheless, any opinions on this aspect would have to wait until the Working Group on Trade and Technology Transfer provides a more comprehensive discussion of other steps to take.

The CIPR goes as far as stating that TRIPS is not the ideal treaty to deal with the issue of technology transfer as it is an agreement that deals with the ownership of technology.[405] This is erroneous in the opinion of the author. TRIPS is the most likely tool to deal with this issue, as

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[400] Ibid, p.7.

[401] See: http://www.wto.org/english/thewto_e/minist_e/min03_e/min03_14sept_e.htm

[402] Council for TRIPS. *Implementation of Article 66.2 of the TRIPS Agreement - Decision of the Council for TRIPS of 19 February 2003*, IP/C/28.

[403] Ibid, para.3.

[404] Commission on Intellectual Property Rights, op cit; pp.25-26.

[405] Ibid.

ownership is not the only concern of TRIPS. Its *raison d'être* is to regulate the trade-related aspects of intellectual creations, and technology transfer would definitely fall into this category. The way in which technology is transmitted is certainly part of the agreement.

For instance, there is enough in the Agreement about licensing to warrant its existence within this legal instrument. Evidence of this is the tacit approval of compulsory licensing in TRIPS. Compulsory licensing could be considered a technology transfer tool taking into consideration the definition examined earlier; although the technology transaction is not necessarily done with the consent of the owner, it will still be notified and in some instances even compensated.

Despite the general flexibility of TRIPS in the area of licensing and the article 66.2, the CIPR is correct in stating that the efficiency of these measures is not enough to establish a coherent international framework of technology transfer, and such an international instrument is sorely needed in this field. As things stand, developing countries are placed in a weakened position in the negotiation of technology transfer agreements, and are also easy prey for abusive business practices.

5. Beyond TRIPS?

The Doha Ministerial Declaration is just one of the elements that may serve as an indication that the tide may be turning for developing countries. There is growing concern about the need to overhaul TRIPS in order to provide better solutions for developing nations, particularly LDCs. As was mentioned earlier, the UK government created the CIPR, formed by different experts and industry representatives from around the world. Their Report was recently published, and it is certainly generating a large amount of talk in the intellectual property circles.

What is generating so much excitement is the fact that the CIPR has postulated some controversial findings in regards to the relationship between less developed countries and international intellectual property protection. They begin the Report by recognising that there is a problem for the poor countries which have no access to technology, and that "*Developing countries - and in particular poor consumers of products which may be protected by IP rights - negotiate from a position of relative weakness. There is a fundamental asymmetry in relationships between developed and developing countries, based ultimately on their relative economic strength*."[406]

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[406] Commission on Intellectual Property Rights. *Integrating Intellectual Property Rights and Development Policy*. Report of the Commission on Intellectual Property Rights, London, September 2002. http://www.iprcommission.org/graphic/documents/final_report.htm

Besides dealing with some specific issues, the Report goes into great detail to describe some of the problems with the existing system of international intellectual property, and in particular those posed by the implementation of TRIPS. The Report recognises and applauds the efforts to deal with some of these issues in the Doha Ministerial Declaration, but asks for more action in some other key areas. The Report makes a set of recommendations to WIPO, the WTO, and to developed and developing countries:

- WIPO should recognise that the implementation of intellectual property protection may have both costs and benefits for developing nations, and that it should ensure that the former do not outweigh the later.
- If a balance between costs and benefits cannot be achieved within the existing framework, WIPO should revise the treaties in order to be able to provide such balance.
- WIPO should be more responsive to the specific needs of particular developing countries when assisting to frame new IP legislation and this process should include more people.
- The implementation timetable for developing countries recognised in TRIPS should be extended to at least the year 2016.
- When adopting bilateral/regional agreements with developing nations, developed countries should take into consideration the terms of implementation recognised by TRIPS.
- WIPO and the WTO should have adequate representation from developing countries during important meetings.
- UNCTAD should appoint two intellectual property experts in developing countries to help during difficult negotiations.
- The WTO and WIPO should open more opportunities of participation for civil organisms, such as NGOs.
- WIPO should fund more research in the area of the relationship between developing countries and the international system of idea ownership.[407]

These recommendations are very specific and timely, and address some of the problems of the misrepresentation of developing countries in the global intellectual property institutions. It is difficult to tell if this Report will be taken seriously by the organisations in charge of setting the

[407] Ibid.

agenda of international intellectual property protection, but its mere existence serves as a very important indication that the tide may indeed be turning in recognition of the special needs of the developing world.

Nevertheless, the imbalance still exists and developed countries have the upper hand in any sort of intellectual property discussions because they still control the technology. This imbalance is evident in many different issues. The next chapter will illustrate the way in which the international regime of technology ownership is actually affecting some developing countries in the acquisition of information technologies.

Chapter 5. Information Society and the Digital Divide

> *"Freedom of the Internet is guaranteed only to those who own a computer."*
> ***Marjorie Heins***

The previous chapters have shown some of the problems faced by developing countries when dealing with the international transfer of technology. In most works that deal with access to technology, the subject of discussion is generally that of patenting because it is the method of IP protection best suited to some of the works related to pharmaceuticals and biotechnology.[408] It is not surprising that the issue of copyright has received less emphasis until now, as the main tool of ownership of intellectual creations in the area of invention and technological advances is patenting.

Nevertheless, copyright must not be underestimated when dealing with the issue of access to technology by developing countries, as there are some areas in which this method of ownership is indeed important for the problem explored. The protection of literary works[409] would not appear to be a big issue, although the high price of technology related publications could be considered a major problem for some poor parts of the world. Literary works can be made available through libraries, and some relatively small investment can provide copies which can be eventually read by many people (notwithstanding the need for increased literacy rates).

One of the biggest problems relating to copyright is the ownership of an increasingly important technology: computer software. The generally high prices of proprietary commercial software in developed countries serve as yet another example of the technology gap that exists in the world, a gap that when seen in the specific area of ICTs is generally referred to as the digital divide. If we consider information technology as the steam that drives the new global economy, there cannot be any doubt that developing countries may find a lack in this area to be an insurmountable competitive block in their attempts to become developed. Proficiency in information technology will mean greater possibilities for attracting investment and generating other technologies indigenously.

The digital divide has generated a large amount of literature the recent years, mostly due to the fact that the advent of the information society is seen as a primary asset and a basic requirement

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[408] See for example: Dutfield, G. *Intellectual Property Rights and the Life Science Industries: A 20th Century History,* Aldershot: Ashgate, 2003.

[409] Specifically books. The Berne Convention and some national legislation consider software as a literary work for all legal purposes.

for development strategies in poor nations. However, most of the existing literature does not concentrate on the issue of intellectual property, but tends to be seen mostly through economic or sociological lenses. It is for this reason that the treatment of this subject will be examined in this chapter. It is also important to explore the digital divide and add it to the other evidence collected so far, in order to examine some of the open source solutions that will be proposed in the next chapters.

1. The Digital Divide

One of the main difficulties in dealing with such a general term as "digital divide" is that it has become an instant sound-bite that encompasses any sort of inequality in the use of information and communication technologies. There is a danger with these instantly popular phrases to become simply an empty buzz-word bereft of any sort of meaning. This is why a clear understanding of what is meant by this term is of immediate concern.

In the widest possible context, the digital divide is usually referred to as the "*inequality of access to the Internet*."[410] The emphasis on the issue of access to the global network is made because there is growing belief amongst many observers that the internet represents a momentous shaping force of modern society in almost all aspects of it, from education to politics.[411] The possibility of empowering people by providing them access to the internet is seen as a positive step that must be encouraged. This assumption that the internet is an excellent feature for society as a whole carries the inevitable consequence that those who lack access will be at a disadvantage to those able to connect to the Web. This is based on the idea that information has become the commodity of the future, and those without access to it will be relegated to poverty. In the words of Titus Alexander, "*In a world governed by information, exclusion from information is as devastating as exclusion from land in an agricultural age*."[412]

The definition provided in the last paragraph is still too broad. Norris usefully enhances the definition of digital divide to explain the different aspects in which it will manifest itself. She specifies that there are three types of digital divide:

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[410] Castells, M. *The Internet Galaxy*, Oxford: Oxford University Press, 2001, p.248.

[411] For an excellent discussion on the impact of the internet in democratic society, see: Poster, M. *CyberDemocracy: Internet and the Public Sphere*, 1995. http://www.hnet.uci.edu/mposter/writings/democ.html

[412] Alexander, T. *Unravelling Global Apartheid: An Overview of World Politics*, Cambridge: Polity Press, 1996, p.195

> *"The global divide refers to the divergence of Internet access between industrialized and developing societies. The social divide concerns the gap between information rich and poor in each nation. And finally within the online community, the democratic divide signifies the difference between those who do and do not, use the panoply of digital resources to engage, mobilize and participate in public life."*[413]

There are several important points in this definition. Firstly, the main problem with access is not access to telecommunication tools in general, or ICTs in a more specific way. Rather, Norris centres her definition on internet access, just as Castells does. Other researchers use a much wider definition, such as Sciadas, who see the digital divide as the gap in access to ICTs, measuring it in the level of "ICT-ization" achieved by a country.[414] This is a useful delimitation of the subject, but it may prove too broad. There can be no doubt that internet access is not the only important factor in the area of information technology advance in developing countries; opportunities for access to computers and other communication technologies are also important, in particular in the area of creating efficient government structures. To this end, the training to use computers is also very important. Nevertheless, the narrow definition of the digital divide will be favoured here.

The second part of the definition worthy of notice is the distinction of the digital divide in three different spheres – global, domestic and political. Although the social divide and the democratic divide display a wide variety of very interesting issues that deserve further study, the so-called global divide is of more relevance for the present work, as it is precisely the difference in access to information technologies between developing countries and developed nations that is central to the present chapter. Nevertheless, a look at domestic differences in access to the information society within developed nations can show interesting facts that can be extrapolated later towards analysing the global perspective and finding solutions.

The best set of figures for domestic access to the internet can be found in the United States, where most relevant studies have taken place. Figures for 2000 showed a marked difference in access to the internet between racial and social groups. For example, while 46% of Whites had access to the internet, only 23.5% of Blacks and 23.6% of Hispanics were online.[415] At the same

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[413] Norris, P. *Digital Divide: Civic Engagement, Information Poverty and the Internet Worldwide*, Cambridge: Cambridge University Press, 2001, p.4.

[414] Sciadas, G. *Monitoring the Digital Divide*. Report by UNESCO Chairs in Communication (Orbricom), 2002. http://www.orbicom.uqam.ca/projects/ddi2002/ddi2002.pdf

[415] Digital Divide Network. *Digital Divide Basics Fact Sheet*, 2001. http://www.digitaldividenetwork.org/content/stories/index.cfm?key=168

time, 86% of households earning $75,000 USD and above per annum had internet access, compared to 12.7% of households earning less than $15,000 USD.[416] Statistics like these indicate marked contrast in access to the information network along income lines, which is to be expected as the internet requires that the user have access to proper tools and infrastructure, such as a computer and phone lines.

Despite these figures, many commentators have noted that the digital divide in the United States is decreasing. For example, in 2002 the amount of people online in households with incomes lower than $15,000 USD had increased to 25%, and access in both Black and Hispanic households had also increased.[417] This trend shows that the digital divide is not irreversible, but it may be misleading to extrapolate too much from the domestic case to access in a global context. After all, the United States already has a comprehensive infrastructure in place, which cannot be said for most developing countries.[418]

This is why every effort to encourage access to the global computer network must take into account the appalling state of telephony in the developing world. By the end of the 1990s, people in the richest countries had at their disposal 74% of all the telephone lines around the world.[419] Countries in the OECD have an average 523 telephone lines per thousand people, while the high-income OECD countries have an average 597. In contrast, developing countries in general average 87 telephone lines per thousand inhabitants. The situation in the least developed countries is even more worrying, with only 6 telephone lines per thousand people.[420]

The figures do not lie when dealing with the facts about the digital divide. Using internet access as an illustration, it is thought that only 2% of the world's population have access to it, and 88% of those connect from developed countries.[421] It is thought that by September 2002 there were 605 million people online, of which only 6.31 million came from Africa.[422] OECD countries average 332 users per thousand people, and high-income OECD countries average 400 users per

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[416] Ibid.

[417] National Telecommunications and Information Administration. *A Nation Online: How Americans Are Expanding Their Use of the Internet,* February 2002, Chapter 8. http://www.ntia.doc.gov/ntiahome/dn/html/toc.htm

[418] For some UK figures, see: Huntley, J; McKerrel, N and Ashgar, S. "Universal Service, the Internet and the Access Deficit", (2004) 1:2 *SCRIPT-ed*, http://www.law.ed.ac.uk/ahrb/script-ed/issue2/broadband.asp

[419] Castells, *The Rise of the Network Society*, Op. cit.

[420] UNDP. *Human Development Indicators 2003: Telephone mainlines (per 1,000 people)*. 2003. http://www.undp.org/hdr2003/indicator/indic_99_1_1.html

[421] Black, op cit.

[422] NUA Online. *How Many Online?* http://www.nua.ie/surveys/how_many_online/index.html

1000. In contrast, developing countries average only 26.5 internet users per 1000, while least developed countries average only 1.8 users.[423]

It is important to keep in mind that figures may be deceiving. It has been calculated that by 2005 China will have more internet users than the United States,[424] but this may simply be caused by the sheer volume of inhabitants. Looking at percentages the figures are still disheartening, with China having only 25.7/1000 people connected to the internet.

2. The causes behind the digital divide

Having established the existence of the digital divide and having provided a specific example of how the divide may be extremely harmful for developing countries, the reasons for the existence of the divide must be explored. Information technology must be seen as comparable to any of the other technologies, and as such would be susceptible to the same intellectual property regimes.

What causes the digital divide? An initial analysis of some of the statistics presented in the first section would seem to indicate that there is a strong link between economic wealth and internet access within a population. It was pointed out that high-income OECD countries had the highest percentages of internet access, and that the poorest countries showed much lower access.[425] This trend would seem to be corroborated by looking into the performance of some individual countries. The United States has a GDP per capita of $35,277 USD, with internet access of 501.5 people per 1000 inhabitants. On the other side of the equation, the Democratic Republic of Congo has only a GDP per capita of $99 USD – one of the lowest in the world – and the internet access is the lowest in the world, with only 0.1 persons per 1000 inhabitants being able to access the global network.[426] These figures are consistent with the hypothesis that internet access is directly proportional to the country's wealth. However, this analysis may prove to be superficial, as a deeper look at the figures yields some interesting surprises.

Iceland for example is the country with the leading figures in internet access for 2003, with a staggering 599.3 people online per 1000 inhabitants, but has a lower GDP (at $27,312 USD per

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[423] UNDP. *Human Development Indicators 2003: Internet users (per 1,000 people).* 2003. http://www.undp.org/hdr2003/indicator/indic_103_1_1.html

[424] Socialist International. "Bridge across the Digital Divide: The Role of Education in the 21st Century", *Meeting of the SI Committee on the Economy, Social Cohesion and the Environment*, Mexico City, 1-2 October 2001. http://www.socialistinternational.org/6Meetings/SIMEETINGS/Economy/Oct01/mexico-oct01-e.html

[425] See supra note 11.

[426] UNDP. *Human Development Indicators 2003: GDP per capita (US$)*. 2003. http://www.undp.org/hdr2003/indicator/indic_111_1_1.html

capita) than other countries with lower internet access figures. The country with the highest GDP per capita for 2003 is Luxembourg (with $42,041 USD), but has only moderate internet access figures (359.8/1000 people). Another discordant statistic is that of three countries that have similar GDP figures per capita are Estonia, Chile, and Costa Rica, all averaging around $4,000 USD in the year 2003.[427] However, Estonia has internet access figures of 300.5/1000 people, Chile has 201.4/100 and Costa Rica only has 93.4/1000. At the lower end there are other discrepancies. Kenya and Gambia have very low GDP per capita figures, with $371 and $291 respectively. However, their internet access figures are much higher than most of other LDCs – 16/1000 and 13.5/1000 respectively – and considerably much higher than other countries within the same GDP per capita bracket, such as Nigeria.

Something else must be at work here. A recent study about internet access in Central American countries may help to elucidate the reasons for the inconsistencies described above.[428] The study calculated differences in cost for an average family to connect to the internet, taking into account the cost of a telephone call and any additional charges for internet connections provided by local companies. When the costs were calculated for a monthly access averaging 30 hours per week, including phone calls, some interesting facts emerge (See Table 1). The two countries with the highest access figures are Costa Rica and Panama, with both presenting very similar average connection costs. However, cheaper connection rates do not seem to translate immediately into higher access, as the cases of Guatemala and Honduras indicate. It would seem logical to assume then that if the cost of connecting to the web is higher in a country, only the wealthiest inhabitants would be able to go online. But when one contrast the figures of access, cost and the number of telephone mainlines, a clearer picture begins to emerge.

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[427] Ibid.

[428] Martínez, J. *Los costos de la Internet: ¿estímulo o desestímulo para su desarrollo en América Central?* Fundación Acceso, Julio 2000. http://www.acceso.or.cr/publica/telecom/REFL3-pppp.shtml

TABLE 1

Country	Access per 1000 people (HDR 2003)	Average cost of connection (per month/30 hours) USD	Telephone mainlines per 1000 people (HDR 2003)
Costa Rica	93.4	$58	230
Panama	41.4	$56	130
El Salvador	23.4	$94	102
Guatemala	17.1	$43.5	65
Nicaragua	14.4	$92	29
Honduras	13.8	$50.5	47

Table 1 shows that there is a strong correlation between the number of telephone mainlines and online connection figures. This indicates that cost is not the only determining factor, as evidenced by the inconsistencies shown in this table and in GDP figures. It appears that there must also be an existing infrastructure otherwise people will not be able to connect. Further evidence can be found in the three countries with similar GDP per capita figures mentioned above: Estonia, Chile, and Costa Rica. Estonia has very high telephone per capita figures (354/1000), which translate into high internet connection ratings (300.5/1000).[429] However, Chile and Costa Rica have very similar telephone mainlines per capita (230/1000 and 233/1000 respectively), yet as previously mentioned, Chile has much better internet connection rates than Costa Rica. The difference may be explained by costs, as a flat-rate internet connection in Chile can cost as low as $21.[430] Cost and income figures are therefore important in calculating the reasons for the digital divide, but actual access to the infrastructure seems to be the vital factor in the ultimate figures.

Another factor to consider is that access to the telecommunications network will only be possible with computers. The statistics mentioned will be useless if the country does not have computers to connect to the network, and software is required to run the computers. Norris recognises this when she lists several other determining factors in the existence of the digital divide, transcending the mere economic analysis of GDP per capita distribution. She lists cost

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[429] UNDP. *Human Development Indicators 2003: Telephone mainlines (per 1,000 people)*; op cit.

[430] Figures taken from Terra, one of the most popular Chilean ISPs. http://www.terra.cl/

of software and hardware, connection costs, and research and development as some of the other reasons that explain the digital divide,[431] but fails to establish the obvious correlation between telephone lines and internet access exposed above.

3. Ghost machines: hardware and the divide

If there is ever going to be an effort to solve the digital divide, then the access to computer hardware would have to be at the top of the list, and it would initially seem like the most difficult area to solve, but it may actually be one of the easiest problems to start tackling. The high cost of hardware is one of the main problems affecting the development of information technology in the developing world, but trends in hardware prices demonstrate that the technology is becoming more accessible every year, with hardware prices continuing to fall. Although a study in 1995 showed that Personal Computer (PC) prices had remained at around $1000 USD for entry-level computers during the first half of the decade despite the drop in costs, this was attributed to hardware and software improvements for each model.[432] Nevertheless, studies charting the price of PC during a longer period of time have demonstrated a continuous decrease in price over time, particularly accelerated at the end of the 1990s.[433] However, top-level computers still cost around $500 USD per unit.

The solution to this problem could lie in the use of charities to provide old hardware from the developed countries and donate it towards less developed ones. It is calculated that each year in the United Kingdom alone, 1.5 million computers are thrown as garbage, and an equivalent amount are kept in storage unused.[434] In the United States, 2 million computers are thrown out each month.[435] Something that could be done in this respect is to have projects that transfer some of this old equipment to poor countries. Another solution for the hardware cost could be to involve socially-minded private industries. Large industries like Microsoft, Sun Microsystems and IBM have already committed funds to provide some computing services for developing

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[431] Norris, op cit; pp.56-57.

[432] Andreson, A; Bikson, T; et al. *Universal Access to E-mail: Feasibility and Societal Implications*, Santa Monica CA: Rand, 1995, pp.54-56.

[433] Berndt, E.R; Dulberger, E.R. and Rappaport, N.J. "*Personal Computer Prices for Laptops and Desktops: A Quarter Century of History", Price, Output and Productivity Measurement Workshop*, National Bureau of Economics Summer Institute, 2000. http://www.nber.org/~confer/2000/si2000/berndt.pdf

[434] For similar statistics, see: Computer Aid International. http://www.computer-aid.org

[435] Aguilar, R. "Where old computers go to live", CNET *News.com*, December 29, 1998. http://news.com.com/2100-1040-219552.html?legacy=cnet

countries, including hardware and open source office application software.[436] Small computer donations could go a long way in establishing information hubs and provide wider access to the web.

3.1 Telecommunications infrastructure

The figures presented seem to indicate that the improvement of telecommunications infrastructure must be a priority for those developing countries that wish to increase their internet access rates. This strategy must run in two separate streams; one is to ensure that the international connections are in place and are suitable for internet transactions, and the second is to improve national telecommunications infrastructure.

There is already an international internet backbone, but the way in which it is configured may prove to pose yet more difficulties for developing countries. The reason for this is that the internet backbone is extremely US-centric – this means that most of the internet traffic passes at some stage through the United States, even if the exchanging countries are close to each other. Cukier cites the example of Singapore and Malaysia, two neighbouring countries that send more than 10 times the amount of internet traffic to the United States than to each other.[437] Another example of the inefficient infrastructure is Africa, where every country – with the exception of South Africa – needs to connect to the internet using an industrialised nation.[438] This status-quo inefficiently increases prices for developing countries because they must lease bandwidth in foreign servers, increasing their costs.

One of the solutions to this problem would be to increase local networks so as to overcome the reliance on developed nations, and in particular on the United States. One way to do this would be for governments to provide tax-credits for telecommunications companies that would decrease internet costs.[439] It must also be noted that although international connection prices remain high, they are constantly decreasing. An example of this is the AC-1 transatlantic cable installed in 1998, which decreased prices across the board. According to Kelly, the price of this cable for an ISP "*is just over US$ 300 per 64 kbit/s circuit per year, whereas the TAT-8 cable,*

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[436] Sun Microsystems. "Sun counters educational digital divide", Sun Microsystems press release, 2002. http://za.sun.com/news/press/2002/020708.html

[437] Cukier, K. N. "*Bandwidth Colonialism? The Implications of Internet Infrastructure on International E-Commerce",* INET99 *Conference*, San Jose California, June 1999. http://www.isoc.org/inet99/proceedings/1e/1e_2.htm

[438] Ibid.

[439] Ibid.

completed a decade earlier, cost more than US$10,000 per circuit per year."[440] Although the architecture still shows problems, it must be said that the network is continuing to grow to provide for more efficient routes between countries, generating increasing traffic between large cities in nations around the world. In fact, Townsend comments that the global efficiency of the network is being improved in places like Europe and Asia, serving as new hubs of internet bandwidth transport for other countries.[441] Looking back at the history of the development of the World Wide Web, there should be no doubt that the process of international interconnections will continue to develop as time goes by, something that will undoubtedly benefit developing countries.

The national telecommunications infrastructure is a more difficult problem to tackle. It has been suggested in earlier sections that internet connection rates are largely dependent on the existence of an adequate phone network system in the country in question. The problem is that the cost of wiring a country to provide improvements in connection rates is considerable. It is difficult to determine the cost of every new line in a developing country because calculations must take into consideration the fact that most of the technology must usually be imported. Even conservative estimates put the cost of each new telephone line at around $1000 USD in areas that do not possess any wiring.[442]

However, the lack of existing copper telephone lines may prove to be an advantage because developing countries may be more likely to use other technologies to connect to the internet instead of relying on existing and outdated telephone networks. The obvious solution would be to take advantage of the rapid growth in the quality of wireless networks and forego the physical wire telecommunications route in favour of adopting wireless communication as the route to increase connectivity. The 2002 World Telecommunication Development Report points out that wireless is the most efficient way to increase telecoms connection figures in countries with minimal advances. The report makes the case of Uganda as a least developed country where the mobile route has increased rates. It points out that "*Uganda's overall telephone density quadrupled between 1998 and 2001, rising from 0.41 telephone subscribers per 100*

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[440] Kelly, T. *Internet peering: What does it mean for developing countries?* Discussion paper for the International Telecommunications Union, 1998. http://www.itu.int/ITU-D/ict/papers/peering/Peering-article.doc

[441] Townsend, A. "Network Cities and the Global Structure of the Internet", *American Behavioral Scientist*, 44(10), February 2001.

[442] Sata, R. "Accelerating the Internet Revolution in Developing Nations", *Commsphere 2000 Conference*, Indian Institute of Technology, Madras, 2000. http://www.tenet.res.in/commsphere/s8.2.pdf

people to 1.72. [...] Over 50 per cent of the population is now covered by mobile cellular and some 80 towns have service."[443]

Setting up a working internet wireless network is much cheaper than wiring up a remote community using traditional connections, thus providing a potential solution to internet connection problems. Estimates for the cost of setting up an entire rural wireless network have been calculated at under $450 USD per hub;[444] but with decreasing prices and the capability of wireless hardware increasing every day, this cost may be much smaller. The costs may still be considerable, but the advantage of this approach is that it can be implemented almost immediately, without having to wait for an entire rural telephony wiring programme to get underway.

There are different wireless technologies that can be used to achieve fast internet connections in remote locations. Some of these are actually being deployed in developed countries to provide broadband internet access in locations where it is otherwise not economically feasible.[445] The way to go appears to be the creation of public wireless access networks run by small foundations or volunteers. These networks create a "wireless commons", a network that everybody in town can access.[446]

The two most viable technologies for fast deployment are via satellite or by creating line-of-sight wireless networks. Each of these solutions offers different advantages and problems, and they may be adopted to fit different situations. Satellite communication would be preferable in very remote areas with smaller connection requirements, and could be used for remote clinics, hospitals or small education centres where only one or two computers will be online. This is more expensive, but prices are steadily on the decrease. Wi-fi[447] local area networks can provide much larger numbers of connections to computers with wireless network capabilities.

The wireless route can also be used successfully in education centres as a community solution. The establishment of low-cost public access wireless internet centres would enable the

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[443] International Telecommunications Union. *World Telecommunication Development Report 2002*. http://www.itu.int/ITU-D/ict/publications/wtdr_02/material/WTDR02-Sum_E.pdf

[444] Jhunjhunwala, A; Ramamurthy, B; and Gonsalves T. "The Role of Technology in Telecom Expansion in India", *IEEE Communication Magazine*, November 1998.

[445] Rubens, P. "Fast track to the shires", *Guardian Online*, July 31, 2003. http://www.guardian.co.uk/online/story/0,3605,1008879,00.html

[446] An example of this is the town of Leiden in the Netherlands. For more details about this project, go to: http://www.wirelessleiden.nl/english/index.shtml

[447] Short for "Wireless Fidelity", a set of wireless communication standards.

provision of services to larger numbers of people for educational purposes. The first stage of the process would be to obtain hardware for this purpose. A study by the Pan African Development Information System places the cost of each internet-ready system in Africa at about $800 USD.[448] That expense coupled with the already mentioned cost of setting up a wireless network would amount to expenses of just over $1000 USD for a small centre connected to the internet, making sure that a community stays connected to the web.

A successful case study of wireless connectivity for education is that of Bangladesh, where there are only two phones per 1000 people, with virtually no traditional telephone lines in rural areas, connection fees in excess of $500 USD, and waiting list of 5-10 years.[449] Recently, wireless technology has been used to connect agriculture students to the capital, located 100 km away, something that would not be possible without wireless connections. [450] There are similar examples in Nepal, where farmers in remote regions of this country are using wireless internet connections to access the internet.[451]

This solution would be the first step in a wider strategy designed to create training hubs where targeted international assistance could have a much bigger effect. This would possibly open high-speed connections and technical training in colleges and universities, attempting to create a small foothold to provide access to people online. A meeting of experts in Mexico in 2001 suggested that "*International co-operation has in some cases to be rethought: more attention has to be paid to the creation of high-quality training and apprenticeship. Elite institutions such as universities and scientific training facilities have to be valued for their vital role in the process of development*."[452]

Nevertheless, even if remote and deprived communities are able to connect to the web with wireless networks and donated equipment, there are still serious problems that need to be addressed. The first one would be sustainability; each of these centres would have to be able to sustain itself after international help has dried up and even if the local political will directs priorities away from ITC connectivity. This is an unresolved question that must remain open for

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[448] Adam, L. "Africa on the line?" *Ceres: The FAO Review*, No. 158 - March-April 1996.

[449] Qadir, I. "Wireless Internet and Development", *Wireless Internet Opportunity for Developing Nations Conference*, UN Headquarters, New York. http://www.w2i.org/pages/wificonf0603/speaker_presentations/W2i_Qadir_Presentation.pdf

[450] Hermida, A. "Wireless net strides Bangladesh", *BBC News*, October 6 2002. http://news.bbc.co.uk/1/hi/technology/2303431.stm

[451] "Wi-fi lifeline for Nepal's farmers", *BBC News*, May 25 2004. http://news.bbc.co.uk/1/hi/technology/3744075.stm

[452] Socialist International; op cit.

the time being. It is easy to imagine centres opening up all over developing countries that will eventually have to shut down because of lack of funds. If these centres eventually start charging for their services it is possible that the amount of money generated would not be enough to provide enough funds to maintain the centre. Charging for services would also defeat the ethos that must prevail at the start of the bridging of the digital divide. This is a serious consideration that governments, aid agencies, and NGOs involved in solving the digital divide must keep in mind.

The other serious problem that has to be taken into consideration is the issue of content and software, which are questions that are considerably linked to copyright, and will be dealt with in the next section.

4. Beyond access: content and ownership

The problems of access to the internet that have been explored so far have dealt primarily with hardware and connectivity to telecommunications networks, issues that while relevant to this work, do not have that much importance to the issue of intellectual property and developing countries. The issue of copyright starts becoming more relevant when we move from the realm of telecommunications to the problem of content. Even if the problem of access to the internet was miraculously solved tomorrow and large sectors of the world's population were able to get online, some questions would still remain. What awaits the people of the developing world once they connect to the internet? Is the content relevant to their needs? Who owns the content? And most importantly, will they be able to understand any of it?

The first problem for developing countries is one of literacy; one fifth of the world's population remains illiterate. Considerable numbers of the populations of the developing world remain immersed in illiteracy, with figures for 2003 standing at an average of 74.5% of the population being able to read and write. The figure for least developed countries is 53.3%,[453] which means that even if the people in these countries could access the internet, almost half of them could not understand what is on the screen.

The problem of content is made worse by the predominance of English as the language of choice for content online. A survey by the research firm eMarketer found that out of 313 billion

[453] UNDP. *Human Development Indicators 2003: Adult literacy rate (% age 15 and above).* 2003. http://www.undp.org/hdr2003/indicator/indic_89_1_1.html

pages searched, 68.4 of them were in English.[454] It must be said that these figures are better than those for 2000, where search engine Inktomi found that 86.55% of one billion indexable documents were written in English.[455] This should take into consideration that only one tenth of the world has English as its native language[456] and that about a quarter of the world's population speaks it either as a native or a second language.[457] Figures for 2003 indicate that only 35.2% of the internet population are native English speakers. At the same time Chinese, Japanese, German and Spanish native speakers make up a combined 36.8% of the internet population.[458] This must necessarily mean that many people are forced to surf the internet in English, as the majority of the content is found in that language, even though 43% of web users do not speak English at all.[459] The implications are severe for the future of a diverse internet full of content that can be understood by people in developing countries. Therefore, any solution to the digital divide must take into consideration the problem of content.

The other problem faced by people in developing countries is one of ownership of online materials. In the early days of the internet, free access to information was the norm, with great numbers of materials provided online free of charge, or only requiring registration to access content. But there is a growing trend by content providers to request subscription fees to be able to access online materials in content-rich environments, such as online encyclopaedias, dictionaries, specialised magazines, journals, research reports and databases. In fact, research by the Online Publishers Association (OPA) in the US estimated that "*by the end of 2002, one in ten online users in the U.S. were regularly paying for some form of content, and total content sales for the year reached $1.3 billion dollars.*"[460] The same report estimates that the trend of providing paid content will continue to grow as the market gears itself to give rich content to niche industries that can afford to purchase increasingly expensive subscription fees.[461] Content

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[454] As cited by: Global Reach. *Global Internet Statistics: Sources & References*, March 2003. http://global-reach.biz/globstats/refs.php3

[455] Inktomi. *Inktomi WebMap*, January 18, 2000. http://web.archive.org/web/20011018122217/www.inktomi.com/webmap/

[456] Wallraff, B. "What Global Language?" *The Atlantic*, November 2000. http://www.theatlantic.com/issues/2000/11/wallraff.htm

[457] Anthony, T. "English: 1 Tongue for the New Global Village", *Associated Press Wire*, April 2000. http://wire.ap.org/APpackages/english/english1.html

[458] Global Reach; op cit.

[459] Ibid.

[460] Online Publishers *Association. Online Paid Content: U.S. Market Spending Report*, March 2003. http://www.online-publishers.org/opa_paid_content_report_030403.pdf

[461] Ibid.

rich sites like the Encyclopaedia Britannica or Oxford University Press (OUP) are already offering a considerable amount of online materials at subscription costs. OUP for example offers materials with annual subscription fees of approximately $250 USD for schools, and between $395 to $3,000 USD for multiple-user accounts.[462]

The end result of this trend towards privatisation of content is that the web might become a two-tier environment, with high-content sites locked away by subscription fees, while the public web contains less valuable information – a negative scenario for those who see the internet as the natural repository of human knowledge. There cannot be any doubt that companies that provide services will have a valid interest in recuperating their investment by selling their content, but the result of this may be to increase the digital divide. Another result of this would be related to the language barriers expressed above; it is natural that content providers would be interested in offering their services only in English because the US market is the one with the purchasing power, while there would be no interest in providing content in other languages because other countries are unable to pay for the content.

The problem of ownership of content is made more severe by the existence of infogopolies, a term used by Drahos and Braithwaite to describe the emergence of small clusters of companies that own vast amounts of copyright works in the areas of publishing, software, music and film.[463] These infogopolies have a vested interest in making sure that as much content online as possible will be protected by copyright, hence providing that information under licences to consumers for economic gains. The area of more concern for the digital divide with regards to ownership by infogopolies is the proprietary software industry. This is an industry that continues to grow at amazing speed despite the global economic slowdown – the industry was worth only $30 billion USD in 1980-1981, but had increased to $400 billion USD in 1995.[464] In 2002 the software industry boasted $73.5 billion USD in profits alone.[465] Because of the substantial profits involved, the software industry is in the process of lobbying intensely for stronger protection and enforcement of copyright laws relating to software around the world;

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[462] Mayfield, K. "Oxford Online: Will People Pay?" *Wired News*, March 28, 2002. http://www.wired.com/news/business/0,1367,51300,00.html

[463] Drahos, P; Braithwaite, J. *Information Feudalism: Who owns the Knowledge Economy?* London: Earthscan Publications, 2002, pp.169-186.

[464] Lateef, A. *Linking up with the global economy: A case study of the Bangalore software industry*, New Industrial Organization Programme, 1997. http://www.ilo.org/public/english/bureau/inst/papers/1997/dp96/index.htm

[465] Haines, A. and Pettey, C. *Gartner Dataquest Says Worldwide Software Spending To Stabilize in 2003*, March 17, 2003. http://www4.gartner.com/5_about/press_releases/pr17mar2003a.jsp

the signing of the TRIPS and the various TRIPS-plus agreements are just some of the many international efforts that have been made in this respect. That is why the software industry has created a powerful industry group called the Business Software Alliance to enforce protection of proprietary computer programmes and fight piracy around the world.[466] It can be assumed that increased protection could result in increased prices for software.

It is difficult to ascertain completely the full effect of proprietary software prices in developing countries. Maskus undertook an interesting study into the effect on software prices caused by stronger enforcement of intellectual property legislation. He looked at the price of proprietary software in Hong Kong, where a pirated copy of Microsoft Office 97 could be found at $6 USD, while the licensed copy was to be purchased at $1,000 USD.[467] This is surprising when contrasted with the average software retail prices in the United States, where the same software sells for about $200 USD. According to Maskus, this phenomenon responds to dissimilar pricing strategies, as software companies may want to sell small volumes at higher prices in developing countries to accommodate higher piracy rates and lower sales figures.[468] This pricing dissimilarity could have severe economic effects in countries where lower prices are needed, as only a few wealthy firms can afford such restrictive pricing strategies and even the slightest increases in software could have serious detrimental effects upon access to information technologies.

Although there are several different areas where all of the above would become relevant, perhaps it is in the education sector where the effects of the digital divide could be felt more intensely. The following section will look at this case in more detail.

5. A case study: Education and information technology

5.1 Education and the developing world

There can be no doubt that education is one of the most important topics whenever the issue of development is discussed, as any effort towards achieving certain acceptable levels of human development must include education as one of the most important tools. In particular, technological education is pinpointed as a very important tool for economic development. As expressed by education expert Jacques Delors:

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[466] Their website can be found here: http://www.bsa.org

[467] Maskus, K. *Intellectual Property Rights in the Global Economy*, Washington: Institute for International Economics, 2000, pp.166-167.

[468] Ibid; p.167.

> *"The developing countries should not neglect anything that may allow them an indispensable entrance to the universe of science and technology, which includes adapting their culture and modernizing their mentalities. Considering this perspective, investment in education and research constitutes a necessity, and one of the main motives for preoccupation by the international community must be the danger of marginalizing those excluded from the progress of a global economy in rapid transformation."*[469]

With the evident importance of education to poor countries, information technology can be an important vehicle for improving education standards in the developing world, and its potential value cannot be neglected. Talking about information technology and education, Mitchel Resnick, from the influential Media Laboratory at MIT, says that "*These new technologies have the potential to fundamentally transform how and what people learn throughout their lives. Just as advances in biotechnologies made possible the "green revolution" in agriculture, new digital technologies make possible a "learning revolution" in education.*"[470]

The experience in the developed world in using information technology in education has been widely regarded as a success. It has been noted that students learn more, and more rapidly, in all areas of study from pre-school to higher-level education. There appears to be a tendency to higher efficiency when using computers for learning, allowing teachers to cover more with less resources and time, ultimately being able to reduce class sizes.[471]

It should be noted that not everybody agrees that spending in information technology is the best thing for education, particularly in developed countries.[472] Nevertheless, the benefits of using information technology in poor countries would potentially have a knock on effect, as it is possible that it would enhance the interest in technology, and increase the chances of development in other areas.

The problem of implementing technological aids to education in the developing world is that it is expensive to do so. It is in this area of education that intellectual property rights play a very important role, as the ownership of some education materials – such as books – can play a negative role in the ability of developing countries to acquire knowledge.

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[469] Delors, J. *La Educación encierra un tesoro*, México: Correo de la UNESCO, 1997, p.74. Translated by the author.

[470] Resnick, M. "Rethinking Learning in the Digital Age" *The Global Information Technology Report 2001-2002: Readiness for the Networked World*, Kirkman, G. S. ed; Oxford: Oxford University Press, 2002, p.32.

[471] Kosakowski, J. "The Benefits of Information Technology", *ERIC Digest on Information and Technology*, June 1998.

[472] For an example of a dissenting view with the perspective of a developed country, see: Cuban, L. "Is Spending Money on Technology Worth It?" *Education Weekly*, February 23, 2000. http://www.edweek.org/ew/ewstory.cfm?slug=24cuban.h19

The existing system allows for some exceptions in education related subjects. For example, existing copyright protection allows for some limited copying of works for educational purposes such as can be expressed in Article 9(2) of the Berne Convention, which allows signatory countries to pass exceptions to copying in certain instances where the public interest is involved.[473] At some point, there were discussions to allow poor countries to have more rights. For example, during the Revision Conference to the Berne Convention held at Stockholm in 1967, a proposal was made to give developing countries the possibility of enacting exceptions to international agreements in education related works, such as translations, and other exceptions relating to works of scientific, research or educational interest. Unfortunately this proposal was not ratified, and it was only implemented in a weaker version in a different meeting which took place in Paris during 1971.[474]

5.2 Yet another technology gap

Having established that information technology can be beneficial for education, it is important to point out that this is yet another field where the technology gap between the developed countries and the developing world is evident. There is growing political recognition that ICTs play an important role in the development prospects of poor nations, and that the lack of connectivity and access to information will have an immense negative effect in those efforts. The World Summit for the Information Society (WSIS) produced a declaration that recognises this problem. Their Declaration states that:

> *"We recognize that education, knowledge, information and communication are at the core of human progress, endeavour and well-being. Further, Information and Communication Technologies (ICTs) have an immense impact on virtually all aspects of our lives. The rapid progress of these technologies opens completely new opportunities to attain higher levels of development."*[475]

While wealthy countries such as the UK talk about linking every single school to the internet,[476] the scenario in the less developed countries in the area of technology is bleak. As stated by Oxfam, "*there is a grave danger that developing countries will be excluded from new areas of*

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[473] An example of such legislation can be found in UK legislation, CDPA, s36.

[474] Ricketson, S. *The Berne Convention for the Protection of Literary and Artistic Works: 1886-1986,* London: Kluwer, 1987, Chapter 11.

[475] World Summit for the Information Society. *Declaration of Principles,* WSIS-03/GENEVA/DOC/0004. http://www.itu.int/wsis/documents/doc_multi.asp?lang=en&id=1161|1160

[476] BBC News. "Blair's five-year internet pledge", *BBC News Online*, Tuesday, 7 March, 2000. http://news.bbc.co.uk/1/hi/uk/668795.stm

learning. And as information technology is integrated more extensively into production systems, the risk of future marginalisation will intensify."[477]

The study by the CIPR in the United Kingdom serves as one of the most worrying reports on access to technology in education. The CIPR states that several consultations within developing countries have shown serious problems of access to software, textbooks, and specialised technical material. The Report explains:

> *"The arrival of the digital era provides great opportunities for developing countries in accessing information and knowledge. The development of digital libraries and archives, Internet-based distance learning programmes, and the ability of scientists and researchers to access sophisticated on-line computer databases of technical information in real time are just some examples. But the arrival of the digital era also poses some new and serious threats for access and dissemination of knowledge. In particular, there is a real risk that the potential of the Internet in the developing world will be lost as rights owners use technology to prevent public access through pay-to-view systems."*[478]

All of these studies seem to agree on one point; implementing information technology in education is expensive. A recent study in the United States indicates that in 78% of schools, students have daily access to computers. According to the study, "*The bulk of technology spending is directed toward hardware, accounting for 67% of total technology spending. Schools spend 20% of their technology budget on software and 14% is devoted to professional development*."[479] Even though large amounts of money are spent on hardware, software budgets are still considerable. In 1995 schools in the United States spent a total of $750 million USD on software alone. It is calculated that for that year, the total expenditure in computer technology was $2.6 billion USD.[480] A recent survey calculates that technology spending per pupil in the United States for the 2001-2002 school year was $96 USD.[481] In contrast, a study in Argentina calculates that the prices for software licenses in the Microsoft 2000 series (which includes Microsoft Office 2000 Pro, Windows 2000 operating system, and Windows 2000 server CLT)

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[477] Watkins, K. *Education now: North-South inequalities*, Oxfam Report, August 1999. http://www.caa.org.au/oxfam/advocacy/education/report/chapter3-1.html

[478] Commission on Intellectual Property Rights. *Integrating Intellectual Property Rights and Development Policy*, op cit.

[479] Market Data Retrieval. *Technology in Education 2001*. http://www.schooldata.com/publications3.html

[480] Glennan, T. K. and Melmed, A. *Fostering the Use of Educational Technology: Elements of a National Strategy*, RAND, 1995, Chapter 3. http://www.rand.org/publications/MR/MR682/contents.html

[481] Marketers Resource Center. *Special Education Sees Spending Increases According to TURNKEY Survey*, 2002. http://www.thejournal.com/marketing/resources/fedpgrms.cfm

would cost $2020 USD per educational institution in the developing world.[482] This trend is corroborated throughout the world; Alan Story reports that software licences per desk cost the same whether one is located in the developed world or in a developing country.[483] Alan Story notes that:

> *"…Microsoft licensing officials in Vietnam and Ecuador have confirmed that the "per seat licensing fee" for universities in those two countries is essentially the same basically the same as Microsoft charges Harvard or Oxford University; an elementary school in Soweto is treated the same way as is a school in a suburb of Boston."*[484]

Another huge problem is the lack of even the most basic tools required to run the computers, even if they are found. A study by Oxfam estimates:

> *"Probably most schools in sub-Saharan Africa and South Asia lack electricity and the telephone lines needed to use computers and access international web sites, let alone the financial resources to purchase them [...] The extension of computer technologies to schools requires substantial financial expenditure for the purchase of equipment and the training of staff. Some governments in the industrialised world have turned to the private sector for assistance. But schools in the developing world face enormous financial and technical obstacles in obtaining basic computer equipment, with the result that inequalities in access to information technology will start to increase at a far earlier age."*[485]

If there is such a problem with spending and software, it must come as no surprise that access to the internet by educational institutions matches that of the country's online figures.[486] A recent study for 2001 shows that secondary schools in developed countries have excellent connection ratios to the internet; in the United States, 94% of schools are online, while data for England and Wales places this figure at 88%.[487] On the other hand, some developing countries show much less favourable rates; in South Africa 52% of schools are online, while in Thailand only 25% of its secondary schools are online.[488]

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[482] Heinz, F. and Heinz, O. *Proprietary Software and Less-Developed Countries - The Argentine Case*. http://www.vialibre.org.ar/lessdeveloped.html

[483] Story, A. "Don't Ignore Copyright, the 'Sleeping Giant' on the TRIPS and International Education Agenda", *Global intellectual Property Rights*, Drahos, P. and Mayne, P. eds; op cit; p.135.

[484] Story, A. *Study on Intellectual Property Rights, the Internet, and Copyright*. Commission on Intellectual Property Rights, Study Paper 5, 2002.

[485] Watkins, op cit.

[486] Norris, op cit; p.55.

[487] Twining, P. *ICT in schools: estimating the level of investment*. Report for Med8, 2002. http://www.med8.info/docs/meD8_02-01.pdf

[488] Ibid.

With the serious problems already enumerated in the area of telephony, the prospects for connection to the internet are bleak. And even after solving these, the problems of content and language of the internet would still remain. It is needless to point out that the amount of money required to ameliorate such shortcomings is beyond the budgets of most poor countries. The problem with this scenario is that while developed countries have the economic means to continue to spend heavily on technology for education, poor countries do not have that possibility. The evidence is a marked lack of education funding in developing countries. A report by Oxfam calculates that although only 21% of the world's population lives in developed countries, they have 84% of the world's education spending. The picture is made worse when considering the fact that Sub-Saharan Africa has only 1% in this field.[489]

The example of Peru also serves as a bleak reminder of the many different problems that developing countries must overcome before connecting educational institutions to cyberspace. In this country, only 31% of all public primary and secondary centres have access to both electricity and a telephone line. 22 % of all educational centres have no access whatsoever to either telephony or electricity in their towns.[490]

These figures serve as a reminder of the technology gap that exists between developed and developing countries. Low spending in education, and in particular, low spending in information technology education, merely reinforces the existing technology gap; students coming out of school in the developing world will not have the means to compete with their well-equipped and trained counterparts, continuing the vicious circle of poverty in which they are immersed.

Even if new education centres the centres can provide access online, what will the education centres provide as content? Will the inhabitants of the developing countries be able to use the internet to its fullest potential or will they find a web filled with subscription content in languages they cannot understand? Part of the strategy in each country must be to look towards developing content as well, perhaps even involving the communities in that same purpose. This would have the added bonus that access to the internet would not be a passive endeavour; the members of the newly connected communities would become contributors of content as well, furthering the diversity of the internet.

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[489] Watkins, op cit.

[490] UNDP. *Visión Sintética del Plan Estratégico Huascarán*, March 2003, p.14.

One excellent example of a carefully considered strategy that attempts to solve the digital divide in the educational system through collaboration between the government, NGOs, and local communities, is that of Programa Huascaran in Peru.[491] This is an ambitious project that attempts to connect all public education centres in Peru to the online environment. The project also provides a wide-ranging online solution for the Peruvian education system by the incorporation of different strategies such as course management, access to a national student, and staff registration database that can be updated directly by the teachers. It also provides different types of content to use in classes. What makes this project unique is that it provides tools not only in Spanish, but also an online dictionary in various indigenous languages such as Cuzco and Aymara. The project also has been attempting to connect remote communities by the use of satellite connections, which have been donated by NGOs and foreign governments. Although the project is in its early stages, this approach seems like a worthwhile effort to solve some of the most pressing issues about online access in least developed nations.

6. Redressing the divide: A new sharing ethos

The evidence presented so far seems to indicate two very interesting trends that are relevant to the present work. The situation regarding hardware, connectivity and telecommunications networks seems to be getting better with the advent of wireless technologies and decreasing prices. On the other hand, access to materials online, and particularly, access to the software necessary to run the hardware is an increasing problem for developing countries.

However, the picture is not as negative as it seems. There are other trends with regards to the internet and software that appear to provide evidence that challenge the traditional trends of ownership of content and the use of intellectual property that stop developing countries from accessing, using and copying information technology and content. There is increasing evidence that there is a growing number of people and organisations that are empowering the sharing of information as a powerful ethical reply to the often selfish and individualistic trends towards more protection.

The internet is the perfect experimental ground for some of these sharing ideas. The sharing of one's works – and in many cases the works of others – has become routine in cyberspace. People create and innovate in a digital environment in which ideas pass through the network without leaving a trace, crossing borders without passports, providing the perfect environment

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[491] The website for the project can be found here: http://www.huascaran.gob.pe

in which the ownership of ideas is no longer relevant. As expressed by Nicholas Negroponte, the famous Internet guru, "*In a digital world, the bits are endlessly copyable, infinitely malleable, and they never go out of print. Millions of people can simultaneously read any digital document - and they can also steal it.*"[492]

Barlow, for example, points out that the digital environment has created a new paradigm for intellectual property. He notes that:

> *"The riddle is this: if our property can be infinitely reproduced and instantaneously distributed all over the planet without cost, without our knowledge, without its even leaving our possession, how can we protect it? How are we going to get paid for the work we do with our minds? And, if we can't get paid, what will assure the continued creation and distribution of such work?"*[493]

The answer to this question is the sharing of information. Returning to previous statements, sharing is being used on the internet as the currency of that borderless country known as cyberspace. The fact that people continue to post content online has to constitute hard evidence against some of the classic mantras expressed in the utilitarian justification for intellectual property.

As the example of science has shown us, sharing has its advantages. In the online environment where electronic bits can be exchanged almost simultaneously, sharing is the obvious result. If users want to obtain something, they learn quite quickly to share their own works as well. Internet activists Mark Surman and Darren Wershler-Henry explain the sharing synergy exhibited online by commenting that "*In a digital environment, sharing […] costs you nothing and earns you a great deal: respect, feedback and good turns in kind.*"[494]

This sharing ethic is born from the strong sense of community taking shape on the internet. People from around the world realise that they can find anything on the internet for free, and develop a sense that you also have to provide the community with information, following from that premise. Mowbray and Bays use the cookie analogy to explain this phenomenon. They notice that there is a gift philosophy taking shape on the internet, arguing that *"Individual Internet users donate content for other Internet users to use free of charge. In return, each individual receives access to all the content made available by others. The amount an individual*

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[492] Negroponte, N. "A Bill of Writes", *Wired 3.05*, May 1995. http://nicholas.www.media.mit.edu/people/nicholas/Wired/WIRED3-05.html

[493] Barlow, "Selling Wine Without Bottles: The Economy of Mind on the Global Net", op cit.

[494] Surman, M. and Wershler-Henry, D. *CommonSpace*, Ontario: Financial Times Prentice Hall, 2001, p.109.

receives is much more than they could ever produce, so the gift economy works in the interest of Internet users."[495] This gift economy works as a cookie recipe for sharing, where a community is encouraged to share their own cookie recipes to the wider audience.

One of the fields in which this type of ethic is more evident is in the hacker movement. Hacker philosophy rests on the premise that the internet is a free medium that cannot be regulated. In this scheme of things, the general feeling in hacker circles is that the internet has no laws, but hackers achieve a sense of community in which sharing of information becomes essential. In fact, the first rule of hacker ethics actually states that *"information-sharing is a powerful positive good, and that it is an ethical duty of hackers to share their expertise by writing free software and facilitating access to information and to computing resources wherever possible."*[496] Anthropologist Steve Mizrach analysed several hacker texts and came up with a set of common ethical practices that could be seen throughout the computer underground community. Among those was the elevation of sharing as an ethical hacker imperative and the expression that information is alive and wants to be free. The use of the word "free" has three related aspects: freedom of movement of information, freedom from control, and free of cost. This is exemplified by one of the hacker maxims: "*Information increases in value by sharing it with other people. Data can be the basis for someone else's learning; software can be improved collectively.*"[497]

These ideas of sharing as powerful creative tools are simply the logical extension of the memetic theory discussed earlier. Powerful ideas will reproduce online, and the internet acts like a giant cultivation dish for information. Doing so, ideas will be reviewed by the largest audience in history, exchanging better solutions, constantly evolving and creating better content. The review is done by clicks instead of words, with links instead of journals. The sharing revolution is being spearheaded by this sense of freedom. Anybody can be an editor on the internet; anybody can post their stories, music, novels, paintings, holiday photographs, crude animations, bad jokes, and recipes online. There is no censor, nobody to say that your work is not good enough for publication, the community is the ultimate reviewer. Technology commentator Michael Lewis expresses this by stating that:

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[495] Bays H. and Mowbray M. (1999) "Cookies, Gift-Giving, and the Internet", *First Monday*, Vol. 4 No. 11, November 1999. http://firstmonday.org/issues/issue4_11/bays/index.html

[496] "Hacker Ethics", *The Hacker's Dictionary*. http://www.hack.gr/jargon/html/H/hacker-ethic.html

[497] Mizrach, S. *Is there a Hacker Ethic for 90s Hackers?* 1997. http://www.attrition.org/%7Emodify/texts/ethics/is.there.a.hacker.ethic.for.90s.hackers.html

> *"Technology has put afterburners on the egalitarian notion that anyone-can-do-anything —especially in fields in which "expertise" had always been a dubious proposition. Amateur book critics published their reviews on Amazon; amateur filmmakers posted their works directly onto the Internet; amateur journalists scooped the world's most powerful newspapers."*[498]

A more detailed analysis of the new sharing economy on the internet can be found in the interesting book by Swedish Internet experts Alexander Bard and Jan Söderqvist called *Netocracy*.[499] In this work, they explain that the traditional capitalist economy does not fare well in the digital domain. Their argument is that the old aristocratic elites are being replaced by a netocracy, a technophile and cosmopolitan class of individuals who have turned cyberspace into their own country, with the defining characteristic that they are more concerned with information than with property or the production of tangible goods.[500] In the new netocracy, intellectual property has little space. They comment that:

> *"…since the central value of the informational economy does not lie in the information itself, but in the sorting and combination of information, the most powerful netocrats need not concern themselves with ownership of copyrights and patents […] The ability to network and gain an overview of large amounts of information that is sought by everyone cannot be copied or stolen; the owner is threatened by nothing but the possibility that someone will prove themselves more talented."*[501]

It would appear that the cybernetic experiment has certainly eroded some of the justifications for intellectual property by proving that people are willing to create without hope of remuneration, and caring little for the strength of protection awarded by laws that protect intellectual creations. The exchange and unlimited flow of information in the digital economy has become the ultimate goal.

Another interesting result of this new medium for the sharing of ideas is that developing countries may also start to try to obtain access to technology by means of the internet. This of course, will presuppose that the access problem itself may be solved with new and cheaper technologies.

There is another field where the sharing ethos can be felt in its widest form, and that is in the realm of software development. It has already been noted that software is a very profitable

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[498] Lewis, *The future just happened*, op cit; p.91.

[499] Bard, A. and Söderqvist, J. *Netocracy*, London: Pearson Education, 2002.

[500] Ibid; p.126-135.

[501] Ibid; p.254-255.

business, and the software industry is one of the most powerful and influential infogopolies in the world. Keeping in mind the tremendous interest of the software industry in maintaining and enhancing intellectual property protection of their works, it must come as a surprise that perhaps the largest theoretical revolution against the traditional justifications behind intellectual property has taken place in the midst of the software industry. This revolution is the emergence of the software development methods called open source software and free software. This phenomenon is of such importance to this work that it will be dealt with separately in next chapter.

Chapter 6. Non-proprietary technology: The open source software experience

> *"The idea that Bill Gates has appeared like a knight in shining armour to lead all his customers out of a mire of technological chaos neatly ignores the fact that it was he who by peddling second-hand, second-rate technology, led them all into it in the first place."*
> ***Douglas Adams***

Earlier chapters have provided some evidence of the problems faced by developing countries in acquiring technology. The last chapter presented some evidence about the specific problem with regards to access to information technology, but it also pointed out that there is a growing trend towards the emergence of a new sharing ethic in the internet that presents some new opportunities for developing countries. This chapter will expand on this sharing ethic in the specific area of software development.

As has been discussed in earlier chapters, most technology is proprietary in nature. Non-proprietary technology is a relatively recent model by which the technological know-how is made available to the public with few distribution restrictions, although it is usually owned with any of the traditional methods of intellectual property rights, such as patents or copyrights.

The best example of non-proprietary technology can be found in software development with the free software (FS) and open source software (OSS) models being the most popular systems of non-proprietary technology available today. Although these models have received a reasonable amount of coverage in specialised literature recently, they have seldom been suggested as a possible method of acquisition of technology by less developed countries. In the context of developing countries, there is one field in which non-proprietary technology can make the biggest impact, that is, the field of education. Less developed nations cannot hope to compete in a global market if they lack human resources, that is, people with adequate training for tackling some of the technological challenges faced by them. By providing low-cost means of acquiring technology, in particular information technologies, it would be possible for these countries to prepare their workforces on a more equal footing and bridge this technological gap.

This chapter will examine the non-proprietary model as it exists in the software industry. The reason for the extended treatment of this model is that legal interest in Europe has been slow to commence, and therefore some of the core concepts and definitions are often confused or

imprecise. After this introduction, the advantages of this system to cash-strapped countries will be discussed, as well as the potential importance for the developing world.

1. Non-proprietary software

1.1 What is non-proprietary software?

It has already been remarked that several types of technology are owned by proprietary means, as expressed in intellectual property legislation. It was later considered that some of these types of proprietary ownership models have received criticism from several commentators, but it was generally concluded that most of these attacks lacked depth, and did not serve to dismiss intellectual property as a viable legal system of protection.

Nevertheless, there is one type of criticism that is winning followers in influential technophile spheres in the richest nations of the world, and it is centred on wider criticisms of copyright as a means of protecting some intellectual creations, in particular software. Software[502] is a set of variable instructions required to operate computer equipment, known as hardware, and as such, it has been classified as subject to the protections awarded to copyright – and in most countries with intellectual property legislation, it is protected as a literary work.[503]

Because of the huge impact of personal computers in the last quarter of the 20th century, software development has become an amazingly profitable business, as expressed in last chapter. Some of these huge profits have been made based on a system of strong copyright protection, where software is developed as a proprietary creation, and later distributed by the manufacturer at a price. But not everybody is following this scheme; there are growing number of people in the software development community that are not using the traditional copyright ownership rights, hence creating a new category of software that could be classed as being non-proprietary.

This scenario is so unlike anything that has been experienced in the last centuries of capitalist values in the West that it is producing a vast revolution in the way some people think about intellectual property. Some of the traditional justifications for the existence of intellectual property come to mind, in particular the economic ones. It has been a basic assumption in the period since the creation of copyright that authors will not share their work if there is no promise of economic remuneration at the end of it. It seems increasingly obvious that these

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[502] "Software", *Whatis.com*, 2001. http://searchmiddleware.techtarget.com/sDefinition/0,,sid26_gci213024,00.html

[503] In the UK, s.3 (1) b of the CDPA specifically states that computer programs are to be considered literary works.

justifications rest on shaky evidence, as it has become evident that the whole economic justification for intellectual property – and in particular copyright – relies heavily on prior assumptions that have not been thoroughly tested, and will likely never be tested. This means that everybody assumes that the economic justification is sound, but there is no evidence to support it. On the other hand, it may be successfully argued that the contrary is true, that there is evidence to indicate that people will still create regardless of whether they will obtain economic rewards from their works.

Non-proprietary software serves as important evidence of this contrary position. It is important to note that the term in itself does not mean that the software will be automatically free, or that it will not be subject to some sort of ownership such as that provided by copyright. In its more general form, it is simply defined as software which is subject to later modifications by the user or other developers by providing the source code[504] to it. In this light, non-proprietary software is considered such if it "*is released with a licence that would permit others to "fork" the software and release their own modified versions without onerous restrictions, even though the copyright may remain in the hands of a single individual. At least in theory, control has been conceded.*"[505]

It is important to stress that it is technically incorrect to refer to non-proprietary software as either open source or free software, which are the two main types of non-proprietary software, but are not the only ones by far. This is why the author prefers the use of the term non-proprietary as an umbrella definition that refers to the different sub-categories encompassed by this movement. This is important because, as will be discussed later, the use of each of these terms presupposes that a specific development philosophy is being followed. It is also better to use this term because it encompasses all different types of works, from those offered in exchange for payment, to those that are offered freely to the public. This would include works that are in the public domain,[506] something that is not included in the OSS or FS definitions. Another acceptable term is "Libre Software" – now in use by the Information Society

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[504] Source code is the programming statements in a programming language that exists before the program is compiled into an executable application. The executable form of the software is generally known as the object code, and can only be read by the machine. It is also known as the binary code.

[505] "Proprietary Software*", Wikipedia*, 2002. http://www.wikipedia.com/wiki/proprietary+software

[506] This is software that has been placed in the public domain specifically by their authors, and is known public domain software to distinguish it from other types. Public domain does not mean free, it simply is a legal term to refer to works that are not copyrighted. See: Stallman, R. *Categories of Free and Non-Free Software*, 1996. http://www.fsf.org/philosophy/categories.html

Directorate General of the European Commission.[507] The Spanish word 'libre' does not have the same meaning as its equivalent in English, and encompasses better the philosophy behind non-proprietary development systems. Another valid way of describing this is to refer to Free, and Open Source Software (FOSS), or even the catchier Free, Libre and Open Source Software (FLOSS).

Having discussed the general definition of non-proprietary software model, it is necessary to explain how it fits with other types of software development, particularly commercial software ownership and proprietary software. Proprietary software is usually defined as a computer program for which its "*use, redistribution or modification is prohibited, or requires you to ask for permission, or is restricted so much that you effectively can't do it freely*."[508] This would of course be the opposite of non-proprietary software, for which there is a possibility of having access to the code and changing it. It must also be stressed that commercial software is a subset of proprietary software, but not all proprietary software is necessarily commercial.

Commercial software is a program that is created specifically to be marketed and sold.[509] There are several types of software that are offered free of charge, but cannot be changed. Examples of this would be other types of proprietary software, such as freeware and shareware. Freeware is software that is offered to the public free of charge, but cannot be changed in any way because it is copyrighted and closed, so that the user cannot incorporate its programming into anything else they may be developing. Shareware is software that is distributed free on a trial basis with the understanding that if the user wants to continue using it, they must acquire a licence for it. Some software developers offer a shareware version of their program with a built-in expiration date (for example, after 30 days, the user can no longer get access to the program). Other shareware (sometimes called liteware) is offered with certain capabilities disabled as an enticement to buy the complete version of the program.[510] Another type of proprietary software that should not be confused with non-proprietary software is called a demo, which is software that presents a limited edition of a program, distributed at no cost over the internet, usually before the general commercial release of the software. The objective is to promote the program

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[507] Working group on Libre Software. *Free Software / Open Source: Information Society Opportunities for Europe?* April 2000. http://eu.conecta.it/paper/paper.html

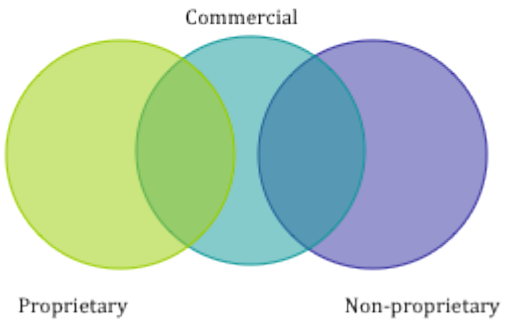
[508] Stallman, R. *Categories of Free and Non-Free Software*, December 29, 2002. http://www.gnu.org/philosophy/categories.html

[509] Ibid.

[510] Ibid.

to a wider audience by presenting some of the wider features available in hopes that users will later buy the full version.

Figure1: Types of software



1.2 A brief history of non-proprietary software

The development of non-proprietary software can be traced back to the creation of the UNIX operating system,[511] which was developed between 1969 and 1970 by a small team at AT&T Bell Labs. AT&T had been the subject of an antitrust suit back in 1949, and because of that it had entered into a consent decree since 1956, in accordance with stipulations established by the Sherman Antitrust Act and as a result of a settlement of said suit. This consent required the company to reveal any patents they held, and to inform them to competitors. The effect of this was that AT&T could not profit from its work on UNIX, so they disbanded the team that had been developing the operating system and started selling it cheaply and with no guarantees, support, or bug fixes of any kind.[512] This prompted users and to band together and start working on fixes to known problems, as the source code was offered to the public as well.[513] By 1974, AT&T was the subject of yet another antitrust suit, which resulted in breaking away from the Bell part of the enterprise, allowing it to commercialise UNIX. Eventually, the company

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[511] An operating system is a piece of software that allows a computer to run, it serves as the basic interface between the user and the computer, such as MS-DOS, UNIX, Linux, OS/2, Mac or Windows. Operating systems are different to what is known as application software, such as MS-Word or Netscape, which are pieces of software designed for a specific function.

[512] Moody, G. *Rebel Code*, London: Penguin Books, 2001, pp.14-16.

[513] Naughton, J. *A Brief History of the Future*, London: Weidenfeld & Nicholson, 1999, pp.172-174.

released a definitive version of the software in 1979, which increased its price, and the source code was no longer made available.[514]

However, as early as 1973 the software had been rewritten to accommodate new hardware variations, and it kept receiving changes from different teams within Bell labs and the wider academic community, in particular in the University of California at Berkeley. The unique environment of sharing between experts, which led to the creation of UNIX, set the tone for the future evolution of the free software and open source movements.[515]

The 1980s saw a culmination of the development of UNIX. Many companies started selling their own versions of the operating system, and the academic community started distributing their own version called Berkeley Software Distribution (BSD).[516] In 1984, a software developer who had been involved with MIT named Richard Stallman formed the Free Software Foundation (FSF) to support the nascent ideas of sharing information in the shape of developing free software and to accommodate the GNU project, which is a repetitive acronym that means GNU is not UNIX.[517] The 1980s saw the development of software under the auspices of the FSF, encouraging the sharing of code between developers that had never met each other. The FSF had been attempting to generate a new UNIX system, but they were missing some key components, particularly a kernel[518] for their operating system.[519]

Nevertheless, the movement did not gain mainstream recognition until 1990 with the development of a UNIX-based kernel called Linux, which began as a hacker project by Finnish programmer Linus Torvalds. Torvalds had been waiting for the developments coming from the FSF and Stallman about their UNIX-based clone system, but wanted to run it right away. The fact that the FSF had not created a kernel yet prompted Torvalds to develop his own kernel, named it Linux and then placed it on the internet for free, asking programmers to improve it.[520]

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[514] Pearson, H. E. "Open Source: The Death of Proprietary Systems?" *Computer Law & Security Report*, 16(3), 2000, pp.151-156.

[515] Moody, op cit; pp.5-12.

[516] McKusick, M. K. "Twenty Years of Berkley Unix: From AT&T –Owned to Freely Redistributable*", Open Sources: Voices from the Open Source Revolution*, Di Bona, C; Ockman, S. and Stone, M eds, Sebastopol CA: O'Reilly & Associates, 1999, pp.31-46.

[517] Stallman, R. *The GNU Project*, 1998. http://www.gnu.org/gnu/thegnuproject.html

[518] The kernel is the fundamental part of an operating system. It is a piece of software responsible for providing access to the computer's hardware by other software applications.

[519] Stallman, R. "The GNU Operating System and the Free Software Movement", *Open Sources: Voices from the Open Source Revolution,* op cit, pp.53-70.

[520] Moody, op cit; pp.31-35.

Torvalds managed to get feedback from other programmers by making sure that he was giving the source code for Linux operating system to be examined by everybody. This led to different versions (known as distributions) of Linux being developed, giving this operating system an unparalleled amount of stability and security as many people were involved in improving it.[521]

The term "open source" itself is relatively new; it was created by a group of Linux developers in 1998 as a reaction to the news that Netscape was going to provide to the public the source code for its internet browser in an attempt to gain an advantage in its ongoing battle with Microsoft for the browser market.[522] The originators of the term wanted to break away of what they deemed was a business unfriendly term, such as free software, and they decided to go for the term open source.[523]

There is a growing animosity between both camps, and this enmity is not only because of the use of different terms. The differences between both camps are deeper than they appear. They both share common criticisms to copyright legislation, and both have the same sharing approach to software, but this is where the similarities stop. The debates between the activists tend to have the strength of an ideological debate, with unrelenting points of view from both sides. The next sections will deal with each of these philosophies separately.

2. Free software

2.1 General characteristics of free software

The free software movement, although centred on the concepts and philosophies of developing programs and distributing them freely, is considered by their creators to be part of wider issues. As expressed by Tony Stanco, a securities lawyer who has become an advocate for free software, *"This movement is really about basic freedoms of everyone, not just developers."*[524]

Free software is not new, it has been noted that software sharing is "*as old as computers, just as sharing of recipes is as old as cooking.*"[525] The description of the rise of free software mirrors that of the early non-proprietary movement described in the previous section, and therefore its history has been that of the FSF and Stallman's work. For a while, the term free software was synonymous with the non-proprietary philosophy of software development. As personal

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[521] UNESCO. *Free Software History*, 2001. http://www.unesco.org/webworld/portal_freesoft/open_history.shtml

[522] Open Source Initiative. *History of the OSI*. 2001. http://www.opensource.org/docs/history.html

[523] Ibid.

[524] Stanco, T. *We are the New Guardians of the World*, May 16, 2001. http://lwn.net/daily/guardians.php3

[525] Stallman, *The GNU Project*, op cit.

computers started getting more widespread, software programmers continued to exchange pieces of code amongst themselves, providing better ways to develop software in more quickly. Other factors that served as an important motivation for the birth of the practice of sharing code came from the fact that earlier software programmers were hired by an academic institution to produce software, so the ownership aspect of software had less importance than it has nowadays.[526] The atmosphere of sharing was vital in these early stages of the movement. Stallman describes it like this:

> *"Whenever people from another university or a company wanted to port and use a program, we gladly let them. If you saw someone using an unfamiliar and interesting program, you could always ask to see the source code, so that you could read it, change it, or cannibalize parts of it to make a new program."*[527]

The decision to create the FSF and the GNU project came from the personal disillusionment felt by Stallman after the collapse of the early software sharing community, and a notable increase in the development of proprietary software. Stallman explains that software began to have restrictions imposed in the shape of restrictive proprietary licences with which software companies started telling users that they could not access the source code to modify the software, or share it with other people with the purpose of enhancing its functionality. If the user did that then the user stopped being a hobbyist and became a pirate.[528] Eventually, Stallman and other like-minded programmers created a powerful software development force under the general principles of non-proprietary software.

It is vital to note that the meaning of the word "free" in free software does not mean free as in having no price, but rather free as in "freedom". Stallman defines free software as having the following four characteristics:

- *"The freedom to run the program, for any purpose (freedom0).*
- *The freedom to study how the program works, and adapt it to your needs (freedom 1). Access to the source code is a precondition for this.*
- *The freedom to redistribute copies so you can help your neighbor (freedom 2).*

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[526] UNESCO, *Free Software History*, op cit.

[527] Stallman, *The GNU Project*, op cit.

[528] *Revolution OS*, Directed by J.T.S. Moore, 2001.

- *The freedom to improve the program, and release your improvements to the public, so that the whole community benefits (freedom 3). Access to the source code is a precondition for this."*[529]

As understood by the proponents of free software, programmers and other developers can charge for the software if it is their desire to do so, but the same underlying freedom behind the software must exist whether or not it is acquired for a monetary fee. The user must still have all of the freedoms described, with access to the source code as the most basic requisite.[530] Stallman and the FSF go as far as stating that "*The freedom to use a program means the freedom for any kind of person or organization to use it on any kind of computer system, for any kind of overall job, and without being required to communicate subsequently with the developer or any other specific entity*."[531]

According to the GNU project, there are several types of free software, some conflicting with the values advocated by the FSF, and some that are not. The main category is an overreaching free software definition, which states that the software qualifies as free software if it "*comes with permission for anyone to use, copy, and distribute, either verbatim or with modifications, either gratis or for a fee. In particular, this means that source code must be available*."[532] Free software that fulfils this broad definition can be distributed in many different ways, the most common of which is public domain software. Distribution in the form of public domain software means that the author has specifically renounced the rights to any copyright in the work, leaving it in the public domain, free for everybody to use.[533]

Stallman justifies this freedom by attacking the traditional justifications of the existence of proprietary software. He argues that the social restrictions imposed by the proprietary nature of intellectual property legislation are damaging to social welfare because they obstruct access to a work, thus damaging the social cohesion and limiting the improvement and further development of ideas.[534] Because of the damage caused by the restriction of works, in particular software, Stallman believes that society should not allow ownership of computer programs. Responding

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[529] Stallman, R. *The Free Software Definition*, 1996. http://www.fsf.org/philosophy/free-sw.html

[530] Stallman, R. *Selling Free Software*, 1996. http://www.fsf.org/philosophy/selling.html

[531] Stallman, *The Free Software Definition*, op cit.

[532] Stallman, *Categories of Free and Non-Free Software*, op cit.

[533] Stallman, *The Free Software Definition*, op cit.

[534] Stallman, R. "Why Software should be free", *Computers, Ethics and Society Values*, Johnson D. and Nissenbaum, H. eds; Englewood Cliffs, NJ: Prentice-Hall, 1995, p.286-291. An online version of this essay can be found here: http://www.fsf.org/philosophy/shouldbefree.html

to the contention that if software is free authors will not be encouraged to get involved in the creative process, Stallman argues that this view is restrictive and does not consider that people do not always create with profit as their objective. Stallman maintains that some people create because of their fascination with a field of work.[535]

The FSF has enacted a policy on granting software with the label free software, where that software follows the philosophy described. If the program is deemed to be imposing too many restrictions, it will not be granted with the certification. Nevertheless, certain restrictions are regarded as acceptable if they are not deemed excessive.[536] One of the main restrictions allowed is that of subsequent licensing to maintain the software as "free". Some of these restrictions will be analysed next.

2.2 Copyleft

From the many different types of free software recognised by the GNU project and the FSF, the preferred type of distribution is by means of copyleft software. Copyleft is free software with a twist. It maintains the general freedoms awarded to users of free software, but by acquiring a copylefted programme, the user has to sign a licence agreement that states that the software will not be used to develop commercial closed source applications derived from it.[537] The FSF has a specific definition of what a proprietary commercial program is for the purposes of copyleft. According to them, a proprietary program is one that is "*software that is not free or semi-free. Its use, redistribution or modification is prohibited, or requires you to ask for permission, or is restricted so much that you effectively can't do it freely.*"[538]

Copyleft was developed from a perceived need to protect the fruits of non-proprietary development. After several years of producing computer programmes with a sharing mentality and offering the code to the public, it became evident that some companies started using this output in a parasitic fashion, obtaining the source code, tweaking it, and selling it as commercial proprietary software with very low costs.[539] Copyleft licensing became the only solution to stop companies from profiting from non-proprietary products and then creating products that go against the spirit of the free software mentality.

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[535] Ibid.

[536] Stallman, *The Free Software Definition*, op cit.

[537] Stallman, *Categories of Free and Non-Free Software*, op cit.

[538] Ibid.

[539] Stallman. R. *Copyleft: Pragmatic Idealism*, 1998. http://www.fsf.org/philosophy/pragmatic.html

For GNU software, the recommended contract to use is the General Public License (GPL). The GPL is a form contract that ensures that the software code is passed on, but anyone who redistributes the software, with or without changes, must pass along the freedom to further copy and change it. This places a burden on the person transferring the software; the burden is that the software must remain "free", as defined by the FSF and the GPL. This is different from just placing software in the public domain because the person making use of the free code can subsequently copyright it.[540]

The GPL is the legal framework that sustains the copyleft system.[541] It reads as a mixture of a legal contract and an ideological manifesto. The preamble to the work restates clearly some of the most common beliefs of free software and the non-proprietary approach, with several admonitions about the meaning of the word "free". The main point is that, as mentioned before, the source code must be made available to the users. The preamble states:

> *"For example, if you distribute copies of such a program, whether gratis or for a fee, you must give the recipients all the rights that you have. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights."*[542]

The licence specifies that this is achieved by two means: by protecting the software by means of copyright; and by providing the users with a licence that gives them the freedom to use and modify the software in any way they see fit. The main body of the licence reiterates these ideas. Section 1 for example states:

> *"1. You may copy and distribute verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and give any other recipients of the Program a copy of this License along with the Program."*[543]

This section also mentions that the user can make monetary charges when passing the copy as long as the charges are for expenses about making copies of the software, which is also consistent with the general free software characteristic that does not discriminate against commercial software as long as it is not proprietary commercial software.

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[540] Lambert, P. "Copyleft, copyright and software IPRs: is contract still king?" *European Intellectual Property Review,* Vol.23, No.4, 2001, pp.165-171.

[541] The full text of the licence can be found in the Appendix 4.1

[542] Free Software Foundation. *GNU General Public License*. http://www.fsf.org/licenses/gpl.html

[543] Ibid.

Many of the provisions of the GPL can be found in other non-proprietary licences, including several OSS ones. What makes the GPL unique is the section 2(b), as this is where the restrictions against using the software to create commercial software are specified. The section reads:

> *"2. You may modify your copy or copies of the Program or any portion of it, thus forming a work based on the Program, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions: […] b) You must cause any work that you distribute or publish, that in whole or in part contains or is derived from the Program or any part thereof, to be licensed as a whole at no charge to all third parties under the terms of this License."*[544]

What this means is that any software developed by using the open source code of the copyleft program must not charge for the derivative product, and most importantly, must ensure that the GPL is transferred to further users of the derivative software. This type of licence has been aptly named a "viral contract" by Professor Radin, defining them as "*contracts whose obligations purport to 'run' to successor of immediate parties*".[545] These contracts would then spread in a viral form, as the licensee must include the terms of the GPL in any subsequent licence they will include to their derivative work because that obligation is part of the contract, and then those subsequent licensees will have to impose the same contractual terms in further licences that they perform, *ad perpetuam*.

Despite the fact that copyleft licences tend to promote the free software principles and the definitions drafted by the FSF and Stallman, it must be pointed out that some of the contractual restrictions existing in licences such as the GPL have prompted criticism from enterprises and commercial users, as it will be expanded in the next section. There appears to be a contradiction about the restrictions against the use of software for charging only for the expenses in making copies as too constrictive, something that does not allow copyleft software to make it to the mainstream. The restrictions imposed by copyleft would seem to go against some of the principles of free software because of the viral imposition of restrictions and obligations, thus denying the very freedom of doing what one desires with the software. The FS proponents should face the fact that this may very well include the freedom to profit from the subsequent use of the code. The use of non-proprietary software to create a proprietary or "closed source" software may be morally suspect, but one cannot elevate freedom to the highest pedestal and

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[544] Ibid.

[545] Radin, M. "Humans, Computers, and Binding Commitment", *Indiana Law Journal,* Vol.75, Fall 2000, p.1125.

begrudge those who will use that freedom for purposes that are philosophically and politically adverse to those of the creator of the programme.

Another conundrum that must be understood is the distinction between contractual enforceability and copyright protection awarded to computer programs. It could be said that copyleft licences create a double-pronged protection of the software. On the one hand, it poses contractual restrictions in the shape of a licence, in particular by the contractual enforceability of the GPL licence and its clauses. On the other hand, works protected by copyleft use copyright protection to be able to make this licence enforceable. This certainly creates a very interesting relationship between the predominant nature of copyright, which is directed towards the protection and regulation of ownership, and a system that seems to advocate the exact opposite. The irony that such a contrary system requires copyright to survive cannot possibly be lost, and it is something that Stallman and many copyleft advocates have trouble answering, even though the websites belonging to the FS advocates are filled with essays that criticise copyright and intellectual property.[546]

Regardless of these problems, the restrictions imposed by copyleft have a good number of outspoken defenders set on furthering the copyleft model regardless of any opposition.[547] Eben Moglen, an outspoken defender of the FS movement and copyleft, has dubbed copyleft as creating a commons perpetuated by the use of copyleft to maintain software free for generations to come. Moglen tries to defend the reliance of copyleft upon copyright by saying that this is an ideological victory:

> *"This use of intellectual property rules to create a commons in cyberspace is the central institutional structure enabling the anarchist triumph. Ensuring free access and enabling modification at each stage in the process means that the evolution of software occurs in the fast Lamarckian mode: each favorable acquired characteristic of others' work can be directly inherited. Hence the speed with which the Linux kernel, for example, outgrew all of its proprietary predecessors. Because defection is impossible, free riders are welcome, which resolves one of the central puzzles of collective action in a propertarian social system."*[548]

The most interesting relation is that between free software as understood by the FSF, and the concept of open source. This will be discussed in the next section.

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[546] For example, see: Free Software Foundation, *Reevaluating Copyright: The Public Must Prevail*, 1996. http://www.fsf.org/philosophy/reevaluating-copyright.html

[547] For one such defender, see: Moglen, E. "Anarchism Triumphant", *First Monday*, Vol. 4, No. 8, August 2, 1999. http://www.firstmonday.org/issues/issue4_8/moglen/index.html

[548] Ibid.

3. Open source

3.1 Open source basics

As it was stated, the term open source was coined during a strategy meeting in February 1998 in Palo Alto California by a group of software developers with links to the Linux operating system, consisting of Todd Anderson, Chris Peterson, John Hall, Larry Augustin, Sam Ockman, and Eric Raymond.[549] The group met to plan a new strategy in response to the groundbreaking announcement by Netscape that they would be opening their operations and providing the source code of the popular Netscape internet browser to the public. Netscape decided to do this prompted by fierce competition by Microsoft.[550] They believed that this gesture would give them a precious opportunity to sell the open source software development approach to the corporate world.[551]

The need to create a term to describe this approach had become evident because until then, the prevalent way to describe all output produced by the non-proprietary approach was by using the expression "free software", based mostly on the philosophies described. It was apparent to many software developers that this movement had a tarnished reputation in the business world as a result of the more radical ideas held by people linked to Stallman and the FSF. In short, it was thought that trying to sell a more commercial non-proprietary approach would not work if they kept referring to the work as "free software". A more business friendly philosophy was needed, and a new name as well. This is where the term "open source" came in, as it was deemed less ideological.[552] Many developers welcomed the new term, helped in great part by the Linux community with the massive assistance of an existing network use of websites, message boards and magazines.[553]

In the widest sense, open source is the opposite of "closed source", the traditional proprietary approach to software development in the commercial world. Closed source is software *"in which the customer gets a sealed block of bits which cannot be examined, modified, or*

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[549] Open Source Initiative, *History of the OSI*, op cit.

[550] It may even be said that Microsoft's competitive tactics against Netscape were excessive and even predatory, and they prompted the anti-trust case brought by the US Department of Justice against Microsoft. A roadmap to the case can be found here: http://www.stern.nyu.edu/networks/ms/top.html

[551] Open Source Initiative, *History of the OSI*, op cit.

[552] Interview with Eric Raymond, *Revolution OS*, op cit.

[553] Open Source Initiative, *History of the OSI*, op cit.

evolved."[554] The main idea behind open source is to provide software for which the source is available for examination, modification, and peer-review.

The official definition of open source came out of the original meeting and was coined by Eric Raymond, the main proponent of the open source movement. He wrote it based on the Debian Free Software Guidelines, a licensing model written by software developer Bruce Perens, which accompanies the Debian GNU/Linux system, a Linux distribution.[555] These existing documents were improved and modified by Raymond, and they form what is known as the Open Source Definition (OSD). The definition not only requires that open source software should make available the original code, but also sets the following characteristics that all open source software should have:

1. Free Redistribution: this means the software will have no restrictions regarding further distribution as part of another package.
2. Source Code: the source code will be made available for examination by everybody, either by including the software in the distribution, or by making it available at a public location.
3. Derived Works: the licence must allow modifications and the development of derived works.
4. Integrity of The Author's Source Code: the licence may allow restrictions about changes to the original source code only if the distributor assumes the responsibility of fixing any problem found with the software.
5. No Discrimination Against Persons or Groups: OSS can be used both for "*abortion clinics and anti-abortion activists*".[556]
6. No Discrimination Against Fields of Endeavour: the licence will not discriminate the usage of the software for specific fields of work.
7. Distribution of License: there will be no need for the development of additional licences for those who receive the software from any party other than the licensee.
8. Licence Must Not Be Specific to a Product: if the software is distributed within a larger software bundle, the software will still be subject to the larger product license.

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[554] Raymond, E. *Keeping an open mind*, March 1999. http://tuxedo.org/~esr/writings/openmind.html

[555] The guidelines can be found here: http://www.debian.org/social_contract.html#guidelines

[556] Interview with Bruce Perens. *Revolution OS*, op cit.

9. The Licence Must Not Restrict Other Software: this means that there will not be any restrictions placed on other software being distributed under the same software bundle.[557]

The main characteristic of open source as defined by these points is the idea of peer-review of a work. By allowing more people access to the code that makes up software, the software will gain in dependability, stability and security. In the words of Raymond *"open source puts the software customer in the driver's seat, dramatically lowers total cost of ownership, and is the only recipe that works for high reliability."*[558]

Since the original coining of the term, open source has gained substantial recognition in many different spheres, but the success has come at a price. As the term gained more credibility and popularity, there was nothing to prevent a software developer to release a software program and label it "open source" as a marketing ploy. This was possible without the software actually fulfilling any of the requirements set by the definition, or worse, maybe even falling into the proprietary category altogether. This lack of enforcement prompted several activists to create the Open Source Initiative (OSI), which analyses software licenses and measures it against the definition, certifying if the software is open source or not.[559] The OSI maintains a public list of all software that it has certified, enabling consumers to ensure that the software they are using is indeed open source.

OSI certified licences display a broad range of licensing models, and it is important to note that some copyleft licences are OSI certified, such as the GPL. Perhaps the licence that exemplifies the OS model most accurately is the BSD licence,[560] which is very short and concise. The main part of the licence is the assignation of rights, which states:

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[557] Open Source Initiative. *The Open Source Definition*, Version 1.9, 2001. http://www.opensource.org/docs/definition_plain.html

[558] Raymond, *Keeping an open mind*, op cit.

[559] Open Source Initiative. *OSI Certification Mark and Programme,* April 30, 2001. http://www.opensource.org/docs/certification_mark.html

[560] See the full text in Appendix 4.2.

> *"Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:*
> *- Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.*
> *- Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.*
> *- Neither the name of the ORGANIZATION nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission."*

It is interesting to contrast this grant of rights with a copyleft licence such as the GPL. The licence is very permissive, as it allows the redistribution of the software both in binary and source code.[561] Other short and elegant OSS licences maintain a very similar approach. For example, the MIT licence[562] is another short licence that has proved to be very popular, and it similarly maintains minimal restrictions.

The most comprehensive non-copyleft, open source licence is the Apache licence.[563] This is a much longer licence than the BSD or MIT licences, and therefore it contains more restrictions. The Apache licence maintains the freedom to redistribute the software in binary or source code form that is prevalent in most OSS licences, but it also adds the right to create derivative works from the original.[564] The redistribution and modification of the work are allowed provided that the copy or derivative works are provided with proper attribution to the originators of the program, and that it also includes the copyright notices attributing ownership of the code to the original programmers. This falls short of the viral clause included in copyleft licences, and it demonstrates one of the main differences between both licensing models. Another interesting feature that is included in the Apache licence is that it includes an assignment of copyright, but it also contains a grant of patent licence, this despite the fact that the Apache Software Foundation, which drafted the patent, have expressed that they do not own or have applied for any patents.[565]

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[561] It must be noted again that binary code and object code are generally considered synonyms.

[562] See full text in Appendix 4.3.

[563] See full text in Appendix 4.4.

[564] In UK law, this would be known as "adaptations".

[565] Apache Software Foundation. *Apache License v2.0 and GPL Compatibility*. http://www.apache.org/licenses/GPL-compatibility.html

3.2 Open source or free software?

A superficial glance at the two main non-proprietary software camps has uncovered some differences in the licences themselves, but there are some other important aspects to consider that differentiate both movements. There are some points shared by both models, in particular one could point towards their common opposition to large closed source software manufacturers like Microsoft, and a shared dislike for the some of the abuses of intellectual property mechanisms, exemplified by constrictive proprietary licences and the patenting of software.[566] Stallman explains these similarities by saying that *"We disagree on the basic principles, but agree more or less on the practical recommendations. So we can and do work together on many specific projects. We don't think of the Open Source movement as an enemy. The enemy is proprietary software."*[567] Similarly, Raymond writes that the sharing of information can only result in improvement of the products and that sharing is beneficiary for society,[568] an opinion echoed by Stallman.[569] He also agrees with the FSF that there are many creators who will be content with non-economic rewards for their labour, such as recognition, but he disagrees that this is always the case. One of the main points Raymond makes is that there is a certain type of proprietary nature to open source; furthermore, he recognises that there are many occasions in which commercial creations work better than free ones.[570]

The main disagreements that these models have are over the level of the emphasis added to achieve their goal of providing free software. David Wheeler exemplifies this by stating that:

> *"The term ``open source software'' [...] is often used by people who wish to stress aspects such as high reliability and flexibility of the resulting program as the primary motivation for developing such software. In contrast, the term ``free software'' (used in this way) stresses freedom from control by another (the standard explanation is ``think free speech, not free beer").*"[571]

The differences are also about the definitions and restrictions of each of the licensing models. Open source requires access to the source code and an adherence to the principles established by the Open Source Definition. On the other hand, free software requires the strict

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[566] Software patents are a growing concern for open source communities. More about this can be seen here: http://swpat.ffii.org

[567] Stallman, R. *Why "Free Software"' is better than ``Open Source",* 1998. http://www.fsf.org/philosophy/free-software-for-freedom.html

[568] Raymond, E. The *Cathedral and the Bazaar*. Revision 1.57, 11 September 2000. http://tuxedo.org/~esr/writings/cathedral-bazaar/cathedral-bazaar/

[569] Stallman, "Why Software should be free", op cit.

[570] Raymond, *The Cathedral and the Bazaar*, op cit.

[571] Wheeler, D. *Open Source Software / Free Software (OSS/FS) References*. http://www.dwheeler.com/oss_fs_refs.html

implementation of FSF approved licences, with the preference of copyleft licences such as the GPL. This means that open source is less restrictive than free software. At a practical level, the main difference is that open source allows the distribution of derived software through commercial purposes, while the GPL does not. Another important distinction is that the OSS movement believes that commercial and proprietary software plays an important role in development, and accept that some companies may choose to produce proprietary software. OSS will then be a choice, an alternative development model. FS activists on the other hand, believe that all software should be free; hence they do not see a role for the existence of proprietary software.

There are also some ideological distinctions, in particular in regards to their approach towards businesses. Free software seems to be inspired by a socialist left-wing ideology, and open source responds better to libertarian sensibilities. However, this ideological clash hides a certain inevitable personality clash between the two main proponents of each of the movements, with the figure of Linus Torvalds as the moderator.[572] One of the many complaints that Stallman makes of the open source philosophy is that it is not strong enough in trying to keep software free, and that it simply allows anybody to name their software "open source" even if it is not.[573] This is something that has been acknowledged by the open source proponents, which is why they have created the OSI certification.

It seems ironic that the main difference between the two movements is the expression of freedom, but it would appear that the less free of the two is the free software approach. By imposing free software licences to use copyleft, it would appear that free software is trampling on the same freedoms that the movement appears to defend. On the other hand, open source would seem freer, as developers may decide later if they want to turn their versions of open source software into commercial software. It does seem that Stallman has a point about the ethical implications of this: companies may very well obtain open source code from one of the outlets available on the internet, tweak and change it slightly, and sell it using a "closed source" proprietary approach. This of course is why the FSF insists on the use of copyleft and the GPL licensing systems.

It would appear that the open source approach is more honest, and commercially more viable. The success of this model can be seen in the almost universal adoption of the term "open

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[572] Moody, op cit; pp.31-40.

[573] Stallman, R. *Why "Free Software"' is better than `"Open Source",* op cit.

source" to label all non-proprietary software and in the term's instant recognition by the public. Free software has almost disappeared from public consciousness, with a lot of people not even noticing a difference between both terms. As has been explained, the differences are there, but they are increasingly academic. It would seem that open source is winning the battle for the hearts and minds of those who advocate and defend the non-proprietary system.

Yet again, the example of this can be seen in Linux. Although it started as a compliment to a free software project, Linux has evolved into an operating system that follows the open source approach more than free software one, as evidenced by the embrace of the open source term by the larger Linux developing community and by various popular distributions.[574] This popularisation of Linux has prompted some FS developers to claim that Linux should not be called Linux, and insist that it should be called GNU/Linux in recognition of the role played by GNU software and the FSF in the kernel released by Torvalds. This seems to be more evidence of the ideological battle from FS activists.

Another advantage of open source against free software is flexibility, as the open source philosophy recognises the need for companies and developers to go with "closed source" in some occasions.[575] The copyleft approach favoured by free software advocates also presents serious problems, as it constrains the future development of the software. Nevertheless, the zeal of the FS defenders should not be underestimated. The GPL is still the most popular licence of all non-proprietary licences, with surveys estimating that more than 70% of this type of all non-proprietary software uses it as their main contractual mechanism.[576]

4. Why does non-proprietary software work?

Regardless of which non-proprietary licensing model is preferred, it would be adequate to ask the question of whether it works in practice. On paper, FLOSS appears to be a counterintuitive system of development computer code. Where are the incentives to authors? Why should a company invest in non-proprietary software? How can a system that is programmed by a rag-tag army of part-time programmers be more secure and dependable than proprietary products created by professional programmers?

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[574] An example can be found in Source Forge, a large open source development community: http://sourceforge.net/

[575] Raymond, E. *The Magic Cauldron,* Revision 1.18, 25 August 2000. http://tuxedo.org/~esr/writings/homesteading/magic-cauldron/

[576] O'Sullivan, M. "Making Copyright Ambidextrous: An Expose of Copyleft", *Journal of Information, Law and Technology* (JILT) 2002 (3). http://elj.warwick.ac.uk/jilt/02-3/osullivan.html

Traditional methods of project management and software development that were prevalent up to the 1990s seemed to spell trouble for non-proprietary software. The traditional model of software development was usually expressed in the following way: "*Adding manpower to a late software project makes it later*".[577] This is what is known as Brooks' Law,[578] which basically is translated as follows: if more programmers are added to a project to finish it earlier, this will create communication problems which will proportionally increase the amount of time that it would take to finish the work. This view of software development seemed to provide proof that software development involving too many different programmers spread around the world would produce mediocre code at very late intervals, but the rise of non-proprietary software proved Brook's law wrong. Nowadays, another law is prevalent. Raymond criticises Brooks' Law by stating that:

> *"[Brook's law] rests on a hidden assumption: that the communications structure of the project is necessarily a complete graph, that everybody talks to everybody else. But on open-source projects, the halo developers work on what are in effect separable parallel subtasks and interact with each other very little; code changes and bug reports stream through the core group, and only within that small core group do we pay the full Brooksian overhead."*[579]

Raymond has named this new way of looking at software programming Linus' Law, which is exemplified by the phrase "*Given enough eyeballs, all bugs are shallow*". This would mean that when more people are involved in a project, there are more probabilities of finding errors in the code, making the resulting program more stable and reliable. Non-proprietary software enhances and requires an environment of sharing that is common in the hacker communities. The resulting environment of FLOSS development is one of constant exchange of ideas and relentless peer-review of the code, resulting in full flexibility and enhanced feedback. The non-proprietary model relies on the three pillars of development advocated by Linus Torvald: "*release early and often, delegate everything you can, be open to the point of promiscuity*".[580]

Raymond likens this environment to a bazaar in his influential essay, *The Cathedral and the Bazaar*.[581] In it, he likens the development of open source software, and in particular Linux, to a

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[577] Thornton, J. "Brook's Law", *Theory of the Week*, February 1, 2002. http://jamesthornton.com/theory/theory?theory_id=27

[578] This can be expressed as the mathematical formula $O(N^2)$, which represents the expected advantage from splitting development work among N programmers is O(N) (that is, proportional to N), but the complexity and communications cost associated with coordinating and then merging their work is $O(N^2)$ (that is, proportional to the square of N).

[579] Raymond, *The Cathedral and the Bazaar*, op cit.

[580] Ibid.

[581] Ibid.

chaotic bazaar of *"differing agendas and approaches."*[582] In this bazaar, programmers work as vendors, always responding to the constant feedback from customers and other vendors. Opposed to the bazaar, there is the cathedral model exemplified by proprietary software and some free software projects. Proprietary software, like cathedrals, are built as grand projects with some experts providing most of the input, involved in a strict working environment, with a development schedule and concise set of rules and a chain of decision making that makes feedback much less important. The resulting software is large, expensive, but perhaps much easier to use, but changes, fixes and updates have long release intervals because they rely on the small group of experts. Raymond admits that some projects require the cathedral model, but he says that the bazaar has proved to work best for fast releases and fixing bugs.

The evidence supports Raymond's astute reading of the non-proprietary model, proving that it can produce good software, and it is gaining recognition amongst developers and enterprises. The most successful example of the non-proprietary model is the Linux operating system. As it has been stated, Linux started as a single user project to provide a UNIX-like operating system. The first Linux version developed by Torvalds in 1991 had 10,000 lines of code[583] and one user. By 1998, Linux version 2.1 boasted more than 7 million users and consisted of 1.5 million lines of code, most of them written in collaborative work between growing communities of enthusiasts.[584] The latest Linux kernel (version 2.6) contains about 3 million lines of code, while a full Linux distribution contains approximately 30 million lines of code. To put this in context, if a large distribution of Linux had been developed as proprietary software, it would have taken 8,000 person-years of development effort, and it would have cost between $1 billion and $1.9 billion USD, depending on the size of the distribution.[585]

The development model means that FLOSS is much more cost effective than proprietary software. But users also keep rating OSS very highly in reliability, stability and security when compared to proprietary software, and in particular Windows operating systems.[586] Surprisingly, some other praises to the non-proprietary model come from within Microsoft. The large software manufacturer has begun showing nervousness about the cult-like status that

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[582] Ibid.

[583] Lines of code are lines written in a computer language which express a set of instructions that the computer will undertake.

[584] Moody, op cit; pp.69-77.

[585] Wheeler, D. *More than a Gigabuck: Estimating GNU/Linux's Size*. June 2001. http://www.dwheeler.com/sloc

[586] For some interesting analysis of Linux vs. Windows in security issues, read: Lyman, J. W. "The Great Security Debate: Linux vs. Windows", *OS Opinion*, March 7, 2001. http://www.osopinion.com/perl/story/7907.html

Linux has on some expert circles and its rising market share in the profitable server business. In a series of damaging memoranda that were leaked to the public –aptly named the "Halloween Documents"– several Microsoft engineers stated:

> *"OSS poses a direct, short-term revenue and platform threat to Microsoft, particularly in server space. Additionally, the intrinsic parallelism and free idea exchange in OSS has benefits that are not replicable with our current licensing model and therefore present a long term developer mindshare threat […] The ability of the OSS process to collect and harness the collective IQ of thousands of individuals across the Internet is simply amazing."*[587]

The statistics would seem to support the optimism and enthusiasm shared by the non-proprietary software proponents. These are some of the facts that serve to illustrate the reliability of this model:[588]

- Apache (non-proprietary internet software) is the number one web server software in the world since 1996.[589]
- Linux was found to be the fastest network operating system at serving applications, beating any other commercial proprietary software.
- Linux outperformed Windows 2000 (a commercial/proprietary product) in tests performed for two years running by PC Magazine.
- Various versions of Linux support more hardware than any other commercial operating system.
- In several tests, non-proprietary operating systems were found to be more secure against hacker attacks than Windows OS.
- Linux is less likely to be attacked by viruses or worms. For example, the most serious attack to Linux servers affected only 3,500 servers around the world.[590] In contrast, MyDoom virus, designed to attack Windows vulnerabilities, infected a total of 33 million computers at its peak in January 2004.

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[587] Open Source Initiative. *Halloween Documents I,* Version 1.14, 1998. http://www.opensource.org/halloween/halloween1.html

[588] As a matter of fact, it is difficult to find unbiased reports about the reliability of FLOSS. A fairly comprehensive and well supported study on the subject can be found here: Wheeler, D. *Why Open Source Software / Free Software (OSS/FS)? Look at the Numbers!* http://www.dwheeler.com/oss_fs_why.html

[589] Wheeler, op cit.

[590] For statistics about worms and viruses, see: http://securityresponse.symantec.com/avcenter/

- Non-proprietary software costs considerably less than its commercial counterparts, not only on cost of ownership, but on hardware costs (it runs on older systems), support and upgrade costs.[591]

Despite all of these advantages, several problems remain with non-proprietary software. Bill Gates sums up these problems by stating that:

> *"Open-source software's strength is massive customization but this works against consistency. Consumers don't know what to expect when they load the software; corporate customers find it hard to stay current as each version is customized; developers don't get a volume market because there are multiple flavors of the same product."*[592]

One of the biggest complaints is that non-proprietary operating systems are remarkably user-unfriendly, and difficult to install and configure, making it difficult for users to become proficient in this type of software. Another complaint is that, although cheap when compared to proprietary software, non-proprietary software suffers from availability problems and lack of support. It has also been repeatedly considered by many critics that non-proprietary software suffers from compatibility issues, as it is not widespread enough to make its general use feasible.[593]

Perhaps the greatest obstacle that non-proprietary software has to overcome in regards to the proprietary model, however, is the widespread reluctance of consumers to forego the Microsoft standard in exchange for something new. Consumers and businesses that have been using Windows for years are reluctant to try a new interface and different file formats that will require them to spend more time learning to use new methods of doing everyday tasks. The problem here is not quality, it is inertia.

Regardless of these problems, it is evident that low-cost non-proprietary systems present an interesting opportunity to developing countries. The next section will deal with the possibilities of using non-proprietary as a cost-effective mechanism to acquire technology for the developing world.

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[591] Statistics taken from: Wheeler, op cit.

[592] Dertouzos, M; Gates, B. "Titans Talk Tech: Bill Gates and Michael Dertouzos" The *People's Computer in Technology Review*, May/June 1999. http://www.lcs.mit.edu/about/titans.html

[593] For some listing of disadvantages, see: WebCab Solutions. *Dissertation on Linux: Disadvantages*. http://solutions.webcab.co.uk/linux/index.html For some more extreme views, visit http://www.linuxsucks.com/ or http://www.linuxsucks.org

5. Non-proprietary software and developing countries

5.1 Goodbye proprietaryware

The lengthy exposition of the characteristics and strengths of non-proprietary software has had the objective of demonstrating the potential benefits of non-proprietary software for developing countries, and such benefits should be clear by now.

A simple cost comparison should suffice to establish some clear advantages of this type of technology for countries that do not have the resources to purchase expensive proprietary commercial software licences. For example, German Linux distributor SuSE calculates that the cost of proprietary licences for operating system and applications generally used for constructing a Windows-based web server would cost almost €6,000 EUR; this generally includes the licences for one system.[594] In contrast, a SuSE Linux distribution that contains all of those applications and can be installed in an unlimited number of systems would only cost €90 EUR; while many Linux distributions can even be downloaded directly from the internet without cost.

Nevertheless, it must be said that free or low-cost Linux distributions come with no support, something that must be purchased. It must also be pointed out that some Linux distributions such as Red Hat Enterprise Linux are offered at considerably higher prices than the free download ones, but these costs generally offer full support, and these packages usually cover unlimited licences. A study by Forrester Research amongst 140 large firms in North America found that even taking into consideration some of the more expensive Linux distributions, the cost of every server machine running Linux was 60% less than a comparable server running Windows.[595] Others have pointed out that the migration from an environment running proprietary software and operating systems into a FLOSS operating system is considerably more expensive than expected. For example, the local government in Munich commissioned a study to find out what would be the cost to migrate from Windows to Linux in their computers. The study found that there was no noticeable difference in cost between migrating to Linux and migrating to a later proprietary Windows version. On the contrary, the study estimated that the migration may cost as much as €3000 EUR per client in hardware, software and training.[596]

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[594] Figures taken from: http://www.suse.com/en/private/products/suse_linux/prof/winprice.html

[595] Giera, J. *The Costs And Risks Of Open Source*. April 12, 2004.

[596] Unilog Management. *Client study for the state capital Munich: Executive summary of the LHM 2002.* July 2003. http://www.forget-me.net/Linux/free-software-study-munich.pdf

However, this implementation may have been badly managed, as there are other examples of cheap migrations.[597] It must also be pointed out that many developing countries, particularly LDCs, do not have any problems about migration, as they do not have any operating systems to migrate from.

Coupled to the obvious cost benefits, non-proprietary software has many other advantages over proprietary software for developing countries. Source code is made available in all open source and free software, which means that programmers can make changes to how the software works. This would give developing countries a good amount of flexibility in adapting the software to their own needs. On the contrary, proprietary software is offered to the user as a block of sealed bits that cannot be changed. Even attempting to reverse engineer and decompile proprietary software could be considered illegal in many jurisdictions.[598] Another advantage for developing countries is the reliability and security of non-proprietary software when compared to proprietary software, as faulty, vulnerable or buggy software costs considerable amounts of money. For example, a survey of IT specialists from CIO Magazine found that companies spend 7% to 8% of their computer-related budgets on security. Another report from 2001 calculates that faulty software costs companies in the United States a staggering $78 billion USD a year.[599]

However, the ultimate advantage of FLOSS in developing countries is the fact that it offers a powerful tool to encourage the development of native technologies, moving from imitation to innovation. True, there will be an initial need to copy and share source code originating from developed countries, but once this has been achieved, then indigenous innovation could ensue. In the words of Wayne Marshall, a UNIX programmer in Guinea: "*Open-source advocates can be sure that Africans get community; Africans get bazaar*."[600]

With these advantages, one should not be surprised that public institutions in developing nations are looking into non-proprietary software in a favourable manner, as it has the potential of helping less developed nations in bridging the digital divide in many areas, assisting in the development of the technological capability of these countries.

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[597] For example, see: Benner, R. "Migration from Windows to Linux saves thousands", *IT Manager's Journal*, January 14, 2004 . http://www.itmanagersjournal.com/software/04/01/09/2231250.shtml

[598] The most famous case is the Digital Millennium Copyright Act in the US. Title 17, Chapter 12, s. 1201 of the U.S. Code only permits reverse engineering and decompilation of binary code for the purpose of testing interoperability.

[599] Levinson, M. "Let's Stop Wasting $78 Billion a Year", *CIO Magazine*, October 15, 2001. http://www.cio.com/archive/101501/wasting.html

[600] Marshall, W. "Algorithms in Africa", *Linux Journal*, June 1, 2001. http://www.linuxjournal.com/article.php?sid=4657

One area where there can be invaluable assistance of new technologies is in government agencies. Information technologies can be used effectively to enhance governance by reducing administrative costs and bureaucracy, making government smaller and more efficient. It can also enhance communication between government, citizens, and other stakeholders in decision-making. The use of information technologies could automate processes and allow access to government agencies from remote areas with the use of remote technologies that would be relatively cheaper to run than a local office.[601] The improvement of democratic institutions is another subject that could have significant effects in poor nations. Skrzeszewski points out that:

> *"An E-Democracy infrastructure will enable democratic participation through online government (live two-way broadcasts of political debates and systems to track legislation), electronic voting, online campaigning, online advocacy and lobbying, and community consultations."*[602]

Non-proprietary software could become an invaluable tool in this push towards e-governance and e-democracy by allowing cost-effective, stable, and secure access to information technologies. There is growing evidence that this phenomenon is taking place even in the developed world. The German Federal government has recently signed an agreement with IBM to purchase computers for use in its offices that will have Linux installed, greatly reducing their costs and increasing security.[603] The Spanish region of Extremadura has decided to move into open source operating systems in public institutions, with a total of 100,000 computers installed with Linux by the end of 2003.[604] Another important development in the European Union is the creation of a non-proprietary unit called "Libre Software", which has conducted a comprehensive study about the viability of introducing non-proprietary software to the EU institutions, which has resulted in a positive outlook.[605]

There is no reason why this phenomenon should not be replicated in developing nations, with a strong emphasis in public institutions and government offices to implement OSS and FS. Some countries are already trying to invest heavily in e-government, an example of this being Costa Rica, where efforts by the UNDP have been able to convert large sectors of the administration

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[601] Heeks, R. "Understanding e-Governance for Development", *Information Technology in Developing Countries*, Vol. 11, No. 3, December 2001. http://www.iimahd.ernet.in/egov/ifip/dec2001/article3.htm

[602] Skrzeszewski, S. "E-Republics: A Model for Global, Open-System Governance", *The Commonwealth Centre for Electronic Governance*, 2002. http://www.electronicgov.net/pubs/research_papers/guest/E-Republics-Stanfinal.doc

[603] "IBM signs Linux deal with Germany", *BBC News*, June 3, 2002. http://news.bbc.co.uk/1/hi/business/2023127.stm

[604] Cha, A.E. "Europe's Microsoft Alternative", *Washington Post*, November 3, 2002, p.A01.

[605] Ghosh, R.A; Krieger, B. et al. *Free/Libre and Open Source Software: Survey and Study (FLOSS)*. Report by the International Institute of Infonomics for the European Union, June 2002. http://www.infonomics.nl/FLOSS/report/

into a "Digital Government" scheme, looking to reduce bureaucracy and increase efficiency.[606] It would be advantageous for efforts like this to try to benefit from the advantages posed by non-proprietary tools.

The best frame of reference in this respect is China, a country that is heavily involved in the development of OSS tools for e-governance. The flexibility of the non-proprietary model can be seen in the development of a Chinese distribution of Linux called Red Flag Linux, which has been developed with Chinese consumers in mind.[607] Another version of Linux called Yangfan Linux (which means "raise the sails") supported by the Chinese government is set to replace Windows and UNIX in all computers and servers in the Chinese government.[608] A survey of Chinese software developers, conducted by Evans Data Corporation, has found that about two thirds of those developers are planning to write OSS-related applications in the next year, a figure that shows the strength to which this model is growing in China.[609] India is another country where non-proprietary software is making strong advances. It is calculated that by January 2004, 10% of all commercial computers sold in India contain Linux as their operating system.[610]

The eventual success of non-proprietary software in such populous countries as India and China would become the greatest encouragement for this model for developing nations. The size of these markets alone would provide serious incentives for other countries to replicate the experiences in China and India – and if successful, it might even create a proprietary and non-proprietary divide.

5.2 Non-proprietary software in education

The last chapter provided clear evidence of the need for developing countries to acquire information technology for educational purposes. This chapter also demonstrated just how expensive it is for these countries to bridge the digital divide in education. Cost has become one of the main reasons for the existence of the gap displayed in educational ITC tools between rich and poor countries, a gap that will not be easily solved in the near future. Solutions to the

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[606] More information on Costa Rica's Digital Government scheme can be found here: http://www.go.cr/gobierno.digital/govdigital

[607] http://www.redflag-linux.com/

[608] Berger, M. "LinuxWorld Expo: Chinese government raises Linux sail", *Infoworld*, August 13, 2002. http://archive.infoworld.com/articles/hn/xml/02/08/13/020813hnchina.xml

[609] Evans Data Corporation. *Chinese Development Survey*, Vol. 2, 2002. http://www.evansdata.com/n2/surveys/chinese_toc_02_2.shtml

[610] "Linux, Microsoft face off in India", *Reuters*, August 11, 2003. http://news.com.com/2100-1016_3-5062158.html

problem of educational access to technologies are complex and involve several different types of strategies, some of them already discussed. Nevertheless, one specific area that can be tackled almost immediately by developing countries is the use made of non-proprietary software for educational purposes.

Proprietary software has several disadvantages that make it less appealing to poor countries. One of the main reasons is cost, as even with different pricing schemes proprietary software will be more expensive than its non-proprietary counterparts. An example of this is the Proyecto Huascarán in Peru, one of the examples offered earlier in which there has been a concerted effort by the government and aid agencies to provide a comprehensive ICT infrastructure for educational centres. This Project has a budget of $553 million USD from 2003-2010. A large part of this budget is taken up by the acquisition of the technological tools required to connect all educational centres to the internet – a total of $304 million USD. Although this amount of money includes hardware purchases, software licences and development will take up more than $100 million USD, mostly through the acquisition of proprietary software.[611] Although it is difficult to ascertain just how much would be saved by the use of non-proprietary software, it is not difficult to imagine that the use of non-proprietary software has made the project more expensive.

Another important concern for developing countries that consider the possible implementation of non-proprietary software is the access to the source code. The source code of proprietary software is closed, which places developing countries in the unfavourable position of having to accept the software as is, with few opportunities to change it and adapt it to their needs – such as language, currency, and other local needs. Changing content may prove extremely difficult if the source code is closed.

On the contrary, many of the advantages of non-proprietary software listed earlier make it a very attractive tool for education institutions, facilitating giant strides in education in the developed world, evidenced by the growing use of non-proprietary software in educational institutions around the world. For example, the largest cluster of computers running Linux exists at the State University of New York in Buffalo, where a network has been established for use by researchers as part of the decoding of the human genome project.[612] This proves that

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[611] UNDP, *Visión Sintética del Plan Estratégico Huascarán*, op cit.

[612] Gross, G. "Linux cluster will help research treatment of cancer, AIDS", *NewsForge*, September 11, 2002. http://newsforge.com/newsforge/02/09/10/1516202.shtml?tid=23

Linux is one of the most viable non-proprietary software schemes that could be used in the developing world. The wide success of the Linux operating system in some institutions in developed countries should be taken into account by educational authorities throughout the developing world. The stability of the system – coupled with its low cost, both in price and maintenance – makes this operating system a very attractive proposition.

Linux is becoming more and more popular, in particular in the higher circles of programming excellence. Top software developers have demonstrated confidence in Linux, and use it on their computers. Linux's obvious stability and growing popularity is a demonstration that the non-proprietary model works, and that quality software can be delivered by using the non-proprietary approach.[613] All of these advantages make Linux a tool of choice for education. As Raymond comments:

> *"The indirect effect of open-source on total cost of ownership is even stronger. Cash-strapped educational institutions love inexpensive software; they love open-source software especially, because it lets students examine and experiment in ways extremely valuable for learning. Universities and technical schools are now beginning to turn out an increasing flood of Linux-aware graduates, each one far more knowledgeable about the operating system than any MCSE can possibly be about closed-source Windows. The potential impact of this on personnel and training costs should not be hard to imagine."*[614]

When taking all of this into consideration, the role of non-proprietary technology for the developing world becomes clear. There is obvious potential for reducing the amount of money spent in software licences by using non-proprietary software, making information technology marginally more accessible to developing countries. An example of this is the Scholar Project in Mexico, which will be installing non-proprietary software Linux in the 140,000 school computer labs in Mexico City, making it the standard operating system in most public schools of the largest city in the world. The project directors in this case came to the conclusion that using commercial software was out of the question, as the amount of money that would have to be spent would have been considerable. As expressed by the project objectives:

> *"The primary reason for reaching this decision was the kind of money we would have had to pay if we went for proprietary software: at US$55 for each machine with Win98 and Office, US$500 for every NT licence and an average of six workstations and one server for 140,000 labs, that's a lot of money."*[615]

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[613] San Miguel, R. "Is Linux poised to topple Microsoft?" *CNN.com*, September 4, 2002. http://europe.cnn.com/2002/TECH/09/03/hln.wired.linux/index.html

[614] Raymond, *Keeping an open mind*, op cit.

[615] Information about this project can be found here: http://www.linux.org.mx/arturo/scholar/#7

Another country that is considering moving into non-proprietary software is Brazil. A large project has now been implemented in the populous state of Rio Grande do Sul in which public education will start using free software, in conjunction with the local Projecto Software Livre RS.[616] The University of Rio Grande do Sul has also moved substantially towards full reliance upon information technology based on the non-proprietary model. The university has 22 campuses all around a large geographical area, and they have decided to interconnect them to share resources with technology running Linux. This amounts to a total of 750 computers, 47 network servers which otherwise would have required installation with commercial licences, thus decreasing the amount of computers for which they could have budgeted.[617]

Non-proprietary software could also help many developing countries to develop their own applications, based on local needs and requirements, and also assist them to avoid becoming what one expert calls "Microsoft client states". Chapman states: "*Not only will they save money, they could build an alternative software development market and model so they're not just sending their money to the United States all the time*".[618]

Another important consideration for developing countries is that there is much less reluctance in trying out new software interface, as is the case in the developed world. Because the education system would begin from the early stages of software training and implementation, it would be much easier for people to become acquainted with the information technology world from the non-proprietary end. Users are not yet "hooked on Microsoft," which means that the implementation of new approaches and technologies will not be met with the transition costs that have made FOSS more difficult to implement in developed nations. It is easier to train users with Linux if they have never used any other operating system. Moreover, developing countries would also be acquiring a cost-effective, stable and secure platform.

Despite the positive steps in education, there are still several problems with the use of non-proprietary models, in particular with software. Proprietary software still has several advantages that make it attractive. Users will always be sure to obtain support from proprietary products, and they can make sure that their applications will run with most versions of Windows. On the contrary, non-proprietary software comes in so many distributions that they may not be able to talk to each other – creating a problem of harmonisation of technological solutions. There is

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[616] The project can be found here: http://www.softwarelivre.org/index.php

[617] D'Elia Branco, M. "Free Software RS Project", *IT4All Conference*, Bilbao, February 2003.

[618] Chapman, cited by Scheeres, J. "Mexico City Says Hola to Linux", *Wired*, March 16, 2001. http://www.wired.com/news/politics/0,1283,42456,00.html

also the fact that the user interface in proprietary products is less complicated, hence the learning-curve for proprietary products tends to be lower.[619] A solution to some of these concerns is to use proprietary operating systems, such as Microsoft Windows, but not to buy expensive Microsoft applications, using non-proprietary applications instead. A proponent of this scheme points out that: "*Contrary to the opinion on many Microsoft critics, using Windows does not mean that you need to use other Microsoft applications*."[620]

The road is indeed difficult, but non-proprietary software still offers some small relief to some of the problems faced by the education authorities in the poorer countries of the world. Perhaps most of the efforts in poor countries should go towards adopting non-proprietary software on a smaller scale, possibly directed at higher education at first. This could allow developing countries at least to gain a foothold in the information technology arena, and it could also make it possible to acquire technology that is in use in developed countries. This would have the benefit of introducing some parts of the population to non-proprietary software. As further updates of FLOSS would not require additional expenditure, the future effects could be immense. A core of software professionals trained in the use of information technology could eventually filter through other areas, such as helping to provide technical assistance to local government agencies, helping them to become more efficient.

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[619] Although Linux is still difficult to learn, there are improvements in this respect. See: Shankland, S. "Morgan Stanley aids Linux learning curve", *CNET News.com*, January 22, 2003. http://zdnet.com.com/2100-1104-981696.html

[620] Bezroukov, N. *Linux as a magic bullet for poor countries myth*, Version 0.40, http://www.softpanorama.org/Articles/linux_as_a_magic_bullet.shtml

Chapter 7. Open access, free licences

> *"Information wants to be free."*
> ***Stewart Brand***

Previous chapters have dealt with the issue of technology transfer as a problem of imitation and control of high-technology generated in developed countries. The issue of the direction of the flow of knowledge rests greatly on the problem of the ownership of the technology. Technology generally flows from developed to developing countries in a limited fashion, constrained by intellectual property protection. Some solutions have been discussed already to address this problem, but there is an obvious solution that has received less attention up to this point. It is possible to suggest that knowledge flows should not only be North-South, the discussion should move towards encouraging the trade of technology amongst developing countries – the emergence of South-South technology transfer and collaboration. It is also useful to think of a common pool of knowledge that can be accessed by all; a common space where the direction of the flows of information become irrelevant.

This common space has been already experimented and explored with the free software and open source software licensing models described in the previous chapter. The non-proprietary software experiment has demonstrated that open development models are viable and sometime even commercially successful. Amongst these models, one of the most interesting licences is that offered by so-called copyleft licenses, those licences that allow software to be transferred with the insurance that the source code will remain open, with the caveat that anyone who redistributes the software, with or without changes, must pass along the freedom to further copy and change it.

However, software development is not the only area in which this licensing model could be applied. The viral nature of copyleft licenses has generated a considerable amount of interest in circles that transcend software development. The idea of sharing materials is not new, and has been made more evident by the chaotic and sometimes anarchic nature of the internet. However, shared materials tend to suffer from the possibility of third parties that use the freely acquired information to turn them into proprietary works. That is why many different organisations are turning to the copyleft model to protect works that are being freely shared online.

This chapter will explore the possible application of non-proprietary software licences to other areas of research that are relevant to developing countries, particularly those that have been

highlighted already during the work – namely health, biotechnology and digital content. To do this, several different licensing models will be explored and particular licences and clauses will be suggested.

1. Trouble with definitions

Whenever the subject of free software or open source software is mentioned, a discussion about terms and definitions is likely to follow, as evidenced by the FS and OSS debate. Both terms have managed to become attached with a specific philosophies and ideologies, and what is more, each of these definitions will usually inform the type of licences used to distribute the work. Some of the discussions may seem academic, but the implication about the use of licences in each definition has a lot of bearing about the exporting the concepts to other areas.

If non-proprietary licences are to be exported from the software forum and into other areas of intellectual creation, then there must be a certain amount of consensus about what is being discussed, and the terms that should be used to define the models. The experience with the free software and open source debate has demonstrated that the use of "free" may be problematic because it implies that the work is being offered without cost, which may be inaccurate description. The Spanish word "libre" has been suggested as well, but although it can be used in other countries, it may prove to be unpopular with other developers.

Superficially, there is a good argument to choose the term "open source", as it is the one that is more readily identifiable in the public perception of non-proprietary software models.[621] However, the term "open source" is problematic because the open source paradigm may not translate well into other fields. Besides, open source cannot be used to identify licensing schemes that do not refer to software at all, and where there is no source code to be open. For example, a recent article in The Economist asks: "*What does it mean to apply the term "open source" in fields outside software development, which do not use "source code" as a term of art? Depending on the field in question, the analogy with source code may not always be appropriate.*"[622] Regardless, "open" appears to be the winning operating word, as evidenced by the adoption of open code[623] as another substitute for OSS.

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[621] As a measure of popularity, Google throws 8,760,000 results for "free software"; and 11,100,000 for "open source".

[622] "An open-source shot in the arm?" *The Economist*, June 10, 2004. http://www.economist.com/displaystory.cfm?story_id=2724420

[623] This is the term preferred by Lessig to avoid the FS/OSS debate. See: Lessig, L. *Code and Other Laws of Cyberspace*, New York: Basic Books, 2000, p.7.

With open source as the inspiration, the term that has become prevalent in the literature in recent years is the term "open access" (OA). Open access is recently being used to identify works that are freely available over the internet (using free in the "liberty" sense). These works will generally be distributed by maintaining their copyright – although the term should be generic enough to define works that have been released into the public domain. Open access then will be any work that has been offered under a permissive licence that allows the redistribution of the work. In recent years, open access has gained some specific connotations, and it is being used to refer to academic journals, particularly after the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities,[624] and the Budapest Open Access Initiative (BOAI).[625] Suber defines open access thus:

> *""Open access" (OA) is free online access. OA literature is not only free of charge to everyone with an internet connection, but free of most copyright and licensing restrictions. OA literature is barrier-free literature produced by removing the price barriers and permission barriers that block access and limit usage of most conventionally published literature, whether in print or online".*[626]

Nevertheless, the term open access is not devoid of problems. Firstly, if the term is now being identified as an expression to define subscription-free academic journals, and there is a high probability that its use may be limited to that field. This would necessitate the creation of further definitions to use in other areas of intellectual creation, such as biotechnology, medicines or other creative arts. Secondly, the term open access is already used for such diverse range of subjects such as freedom of information, competition law and even digital divide subjects,[627] which may create needless confusion of terms and definitions. Thirdly, there are substantial numbers of hardcore free software activists that resent the use of the word open, preferring the definitions and philosophies exemplified by the free software movement.[628] Using "open access" will probably serve to further alienate those who dislike its use in software development.

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[624] Full text of the declaration can be found here: http://www.zim.mpg.de/openaccess-berlin/berlindeclaration.html

[625] More about the initiative in this site: http://www.soros.org/openaccess

[626] Suber, P. *Creating an Intellectual Commons through Open Access*, May 28, 2004. http://dlc.dlib.indiana.edu/archive/00001246/01/suberrev052804.pdf

[627] For example, see: Piropato, M. "Open Access and the Essential Facilities Doctrine: Promoting Competition and Innovation", *University of Chicago Legal Forum*, 2000, p.369; and Feld, H. "Whose Line is it Anyway? The First Amendment and Cable Open Access", *CommLaw Conspectus*, Vol. 8, Winter 2000, p.23.

[628] Stallman, *Why ``Free Software'' is better than ``Open Source''*, op cit.

Some other solutions could be found to bypass this conceptual quagmire, such as finding alternative names for the licensing movement. This is already being performed with the creation of specific licensing models and definitions for separate fields of endeavour. A good example of separate definitions can be seen in the Creative Commons (CC) project, which attempts to create "*intellectual property conservancies*",[629] separating a block of human knowledge offered for the benefit of the public, but still protected by intellectual property licences. This would be analogous to nature conservation areas that exist for the wider social benefit, but have restrictions on certain uses. In the Creative Commons, the goal of intellectual property conservancies is achieved through the offering of a wide variety of licences to protect creative works.

Because Creative Commons licences are geared specifically towards creative works such as music, literature, photographs and paintings, a new concept has been designed to accommodate scientific research, such as biotechnology and medicines. This concept is the Science Commons, which has been created by the Creative Commons Project and will deal with other areas that are not covered at the moment by existing CC licences.[630]

Although the differentiation of concepts may be useful in the future, there is still need to identify the entire model with a generic term. This is needed because both Creative Commons and Science Commons are part of a wider movement that is compatible with the non-proprietary software model and the open access definition.

The author suggests that at present, the best definition is open access, but it will have to be reworked to identify more than just academic online journals, as it has been the practice up until now. The new definition will have to recognise that not all open access needs to be provided online, as it would be perfectly feasible to assume that there will be circumstances in which open access works could be offered through offline copies. Paraphrasing the earlier OA definition, open access will be any work that is offered to the public domain, or that maintains its intellectual property protection but is offered to the public through a permissive licence that allows the copying and redistribution of the work.

This definition has the advantage that is open enough to accommodate a very wide range of licensing schemes – including software licences. More details about a possible definition and standards of open access licences will be dealt with later in the chapter.

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[629] Creative Commons. *Legal Concepts*, 2003. http://creativecommons.org/learn/legal/

[630] Creative Commons. *Science Commons*. http://creativecommons.org/projects/science/proposal

2. Open access

The suggested definition of open access can be used to cover different types of intellectual works, from music to biotechnological creations. This requires an adequate subdivision of all of the types of licensing schemes that are covered by the definition. Non-proprietary software works would be covered within this definition and have been dealt with already, so they will not be listed here. Besides software, open access works cover two other main types of creations subject to intellectual property protection: content and scientific research. This section will list the efforts to provide open access to these two types of works.

2.2 Open content

The discussion in previous chapters regarding the digital divide evidenced the need to address the issue of access to works via the internet not only from the perspective of access to the worldwide network, but stressed the importance of addressing the problem of lack of quality content once people find themselves navigating the web. This problem can be solved by the adoption of open access to content. This content includes literary works, educational materials, music, traditional knowledge and artistic works.

The largest repository of open content at the moment is the Creative Commons content directory, which lists all of the work that is being offered using one of the many CC licences available through the CC website. At the time of writing, the Creative Commons archive includes 2649 directories of works, of which 400 are audio, 41 movies, 362 images, 685 texts, 216 educational works and 178 technical materials.[631] It is important to point out that most of these are collections, which means that the number of individual works should be much greater. The works licensed through Creative Commons licences attempt to use intellectual property to ensure public access to content. In their words:

> *"We use private rights to create public goods: creative works set free for certain uses. Like the free software and open-source movements, our ends are cooperative and community-minded, but our means are voluntary and libertarian. We work to offer creators a best-of-both-worlds way to protect their works while encouraging certain uses of them — to declare "some rights reserved.""*[632]

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[631] For a list of directories, see: http://commoncontent.org/

[632] Creative Commons. *"Some Rights Reserved": Building a Layer of Reasonable Copyright.* http://creativecommons.org/learn/aboutus/

The Creative Commons idea has prompted the establishment of many other different projects that intend to offer open content to the public. The BBC has created the British Broadcasting Corporation Creative Archive (BBCCA),[633] which plans to place some of the BBC's professionally produced content online.[634] Importantly, the BBC has stated that the Archive "*will establish a pool of high-quality content which can be legally drawn on by collectors, enthusiasts, artists, musicians, students, teachers and many others, who can search and use this material non-commercially*."[635] This seems to indicate that the BBC will be using some sort of open access licence, probably compatible with CC licences.[636]

Education is another area that can benefit greatly from the open access ethos. Open Courseware[637] is a project by the Massachusetts Institute of Technology (MIT) that offers free educational course materials and free online courses online for a wide variety of subjects, ranging from Aeronautics to Writing. Open Courseware courses signal the willingness of a respected institution to provide their intellectual property openly for a worldwide audience. It must be pointed out that this project is offered using Creative Commons licences, enhancing the further distribution of the materials. This example of open access is of particular interest for developing countries, as there is a marked emphasis on technical subjects and the sciences, which may prove to be an invaluable source of content for cash-strapped educational institutions in developing countries. However, efforts must be made to make more of this content available in languages other than English.

Wikipedia[638] is another excellent project that generates freely available open content that can be distributed with some restrictions. Wikipedia is an online encyclopaedia that is written by the users in a method known as a wiki,[639] which is a collaborative effort where users can modify the content to ensure its novelty and usefulness. Although there are some problems with the accuracy of the content,[640] one of the strengths of Wikipedia is that it is offered through a

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[633] See: http://www.bbcmotiongallery.com./customer/index.jsp

[634] Dean, K. "BBC to Open Content Floodgates", *Wired News*, June 16, 2004. http://www.wired.com/news/culture/0,1284,63857,00.html

[635] BBC. *The Future of the BBC*, 2004. http://www.bbc.co.uk/thefuture/

[636] This has prompted some groups to lobby to ensure that the BBCCA will remain non-commercial. See: http://www.public-domain.org/?q=node/view/36

[637] See: http://ocw.mit.edu/index.html

[638] http://en.wikipedia.org/wiki/Main_Page

[639] Wiki is a Hawaiian word that means "quick".

[640] A problem that is recognised by Wikipedia itself. See: http://en.wikipedia.org/wiki/Wikipedia:Why_Wikipedia_is_not_so_great

copyleft licence, which states that "*content can be copied, modified, and redistributed so long as the new version grants the same freedoms to others and acknowledges the authors of the Wikipedia article used*".[641]

Although the aforementioned efforts go a long way towards creating considerable open content, perhaps the greatest encouragement for open content is the promulgation of the open access journal movement as exemplified by the aforementioned Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities of October 2003. The Declaration is the end result of a three-day conference organised by the Max Planck Institute in Berlin in which experts from German and international institutions gathered to discuss the implications of using the internet as a medium to communicate research results and as the main publishing medium. The Declaration is not only directed towards educational and research institutions, but attempts to promote open access dissemination of cultural works by museums, libraries and archives. What makes the declaration unique is the fact that the definition of materials that should be disseminated through open access should meet scientific requirements. The Declaration states that "*We define open access as a comprehensive source of human knowledge and cultural heritage that has been approved by the scientific community*." This requisite sets the definition of open access managed by the Declaration apart from other open access projects, such as Wikipedia or the Creative Commons, as there appears to be a scientific peer-review prerequisite in the way in which the information is disseminated. This is because the internet contains too much information already, much of it garbage, a fact that may prompt users to reply on a few websites filled with low-quality or inaccurate content.[642] Peer-review would be the way to filter out the dross.

The Berlin Declaration is just the latest of a growing number of efforts to provide high-quality content open access journals, evidenced by the aforementioned Budapest Open Access Initiative, the Bethesda Statement on Open Access Publishing,[643] and also the European Cultural Heritage Online (ECHO) Charter.[644] The common denominator of these projects is the free access online to scholarly academic literature. The BOAI explains it thus:

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[641] Wikipedia. *Wikipedia: copyrights*. http://en.wikipedia.org/wiki/Wikipedia:Copyrights

[642] Sunstein, C. *Republic.com*, Princeton, NJ: Princeton University Press, 2001.

[643] http://www.earlham.edu/~peters/fos/bethesda.htm

[644] http://www.ling.lu.se/projects/echo/contributors/charter.html

> *"By "open access" to this literature, we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself."*

There is a growing understanding that this model is the future of academic content. Studies indicate that journals that are available online have wider circulation and are more cited than more prestigious journals. A study of 119,924 conference articles in computer science found that the most cited articles were significantly most likely to come from journals available online than from offline journals by an average 336%.[645] Another study in the United States has found that online journal publishing is economically sustainable under the present system because the revenue obtained by each published article from the publisher is equal to the cost of producing the article, which removes the economic recuperation justification. The study points out that "*The monetary cost of the time that scholars put into the journal business as editors and referees is about as large as the total revenue that publishers derive from sales of the journals*."[646]

It must also be remarked that open content is just another continuation of the sharing ethic exemplified by the internet that has already been discussed. The implications for technology transfer to developing countries are evident. Freely available online content of peer-reviewed material should provide a manner to access academic research, which is one of the most important tools to allow countries to develop their own technology and strengthen their own research capabilities.

2.2 Open science

It could be argued that open content is a logical progression from the coming together of the internet and non-proprietary ideals. One could also argue that open content can be more easily subject to the protection of open licences because creative works are generally protected via copyright, which subsists in an original work as soon as it is fixed in tangible form.[647] Therefore, it should come as no surprise that most successful open licences to date are those that protect works subject to copyright, such as software, journal articles and artistic works. The

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[645] Lawrence, S. "Free online availability substantially increases a paper's impact", *Nature*, May 31, 2001. http://www.nature.com/nature/debates/e-access/Articles/lawrence.html

[646] Odlyzko, A. "The Economics of Electronic Journals", *First Monday*, Vol.2 No.8, 1997. http://firstmonday.org/issues/issue2_8/odlyzko/index.html

[647] Berne Convention on Literary and Artistic Works, Art. 2.

reason for this is simple, if copyright "*flows from the nib of a pen*",[648] it is much easier to distribute copyrighted works with an open licence as soon as it is originated, without requiring previous registration. On the other hand, works that require some sort of registration to be subject to protection – such as patentable scientific research – will be more difficult to distribute through an open licence, as there are several steps that are required to be able to distribute it as an open access work.

Despite this problem, there is growing interest in using open licences to protect scientific research in other areas that are endangered through appropriation by commercial interests. After all, the scientific method has worked through the idea of peer-review and publication of scientific findings, ideas that are similar to the FLOSS ethos of collective development. Science works best when it is a collective effort, and the use of copyleft licences could ensure that collective efforts will remain accessible to the public at large.

It would be similarly possible to apply the copyleft model to protect other works in areas as varied as biotechnology, biodiversity databases, traditional knowledge and medical research. Non-proprietary and open access models would be an excellent option to maintain a body of technological knowledge that can be shared without fear of misappropriation by commercial interests, facilitating technology transfer to developing countries. This can be understood as open science. According to Maurer:

> *Open science is variously defined, but tends to connote (a) full, frank, and timely publication of results, (b) absence of intellectual property restrictions, and (c) radically increased pre- and post-publication transparency of data, activities, and deliberations within research groups.*[649]

This section will look at two particular areas of technology that could benefit from open access, biotechnology and medicine research.

2.2.1 Open biotechnology

The race for decoding and cataloguing the human genome[650] can be used as an example of the dangers of sharing valuable scientific research through unprotected means. Many scientists and

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[648] Cohen, P. and Ryan, T. *Copyright Law and the Internet*. http://info.utas.edu.au/docs/info/utas88/Peter.Cohen.html

[649] Maurer, S. "New Institutions for Doing Science: From Databases to Open Source Biology", *European Policy for Intellectual Property Conference on Copyright and database protection, patents and research tools, and other challenges to the intellectual property system*, University of Maastricht, November 24-25, 2003. http://www.merit.unimaas.nl/epip/papers/maurer_paper.pdf

[650] For an account of this race, see: Sulston J. "Intellectual Property and the Human Genome", *Global Intellectual Property Rights: Knowledge, Access and Development,* op. cit; pp.61-73.

researchers working in the biotechnology field have made calls to release genetic research online, which constitutes a de facto release of the research into the public domain. This is evidenced by the Human Genome Organisation (HUGO) protocols and the Bermuda Principles.[651] The release of the information into the public domain would have the effect of widening the research and dissemination of results achieved by organisations around the world. Another effect of the release of materials into the public domain would be to pre-empt future patent applications, because the research has been already made public. Eisenberg explains this tactic:

> *"In addition to making it difficult for publicly-funded investigators and their institutions to file timely applications for patents, the Bermuda rules also lead to the prompt creation of "prior art" that could potentially defeat patent claims based on similar DNA-sequencing efforts in the private sector. No one can get a patent on something that was already publicly disclosed before the patent claimant discovered it."*[652]

Despite this seemingly watertight solution, there is still a real potential that the information that has been made available for free could be copied and then used to make patent applications about that same material. The chaotic state of patent application in areas such as software and biotechnology – particularly in the United States[653] – provides a warning that patent offices cannot be trusted in identifying whether a patent application is innovative, or if it is based on prior-art.

The state of affairs in biotechnology patenting generates considerable problems for all of those involved in this area. The misuse of patenting threatens to hinder collaboration and research considerably because it generates an environment that lives in constant fear of litigation. A study conducted in 2002 has found that researchers working in the area of genetics have reduced significantly normal academic collaboration practices due to fears about patents.[654] Similarly, overly broad gene patents could be used to attempt to gain a foothold in the market and stifle competition in the nascent biotechnology industry. Small research centres, educational institutions and individual researchers may find it difficult to conduct research for fear of

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[651] For a look at a summary of both meetings, see: http://www.ornl.gov/hgmis/research/bermuda.html

[652] Eisenberg, R. S. *The Public Domain in Genomics*, 2000. http://www.law.nyu.edu/ili/conferences/freeinfo2000/abstracts/eisengberg.html

[653] For more about patent abuse in these two fields, see: Gratton, E. "Should Patent Protection Be Considered for Computer Software-Related Innovations?" *Computer Law Review & Technology Journal*, Winter, 2003, p.223; and Andrews, L. "The Gene Patent Dilemma: Balancing Commercial Incentives With Health Needs", *Houston Journal of Health Law and Policy*, 2002, p.65.

[654] Blumenthal, D. et al, "Data Withholding in Academic Genetics", *JAMA*, 2002, pp.477-480.

becoming involved in a patent suit. Moreover, even if a biotechnology patent has been erroneously granted, stakeholders and researchers would still need to get involved in a lengthy procedure to cancel the invalid patent, further stifling research.[655] A decrease in the practice of sharing biotech research could have nefarious consequences to the field, as the exchange of data held in different databases could be hindered.[656]

This is where open access biotechnology could provide an excellent tool to foster the exchange of research and the transfer of technology amongst researchers all over the world. The first effort to create a licence was performed by Tim Hubbard of the Sanger Institute in the UK, which was involved in the Human Genome Project. Hubbard became interested in open source and open content licences, until one day he realised that the model could be used to protect human genome research.[657] Although Hubbard drafted a licence, the idea was never implemented by the Sanger Institute because all of the materials were being released into the public domain. John Sulston, a prominent voice in the genetic research community, has provided some sobering comments about the fact that protecting scientific works intended for public dissemination with a licence is contrary to the ethos behind such undertaking.[658] The idea is to make the works available to the public, not to tie them up in legal battles and complex patent suits.

There have been other suggestions that copyleft licensing models could be used to protect the public results of the biotechnology research, although such schemes have never been implemented.[659] The idea behind open biotechnology would be to produce results and protect them by using non-proprietary licences – particularly copyleft ones. The research would be made available to the public online with an attached licence that allows further uses of the material, but forbids the commercialisation of the research by threatening to enforce the intellectual property rights that protect them. This strategy would be compatible with the existing ethos of sharing research that exists in the scientific community. Talking about the possible use of the open source model in the field of bioinformatics, scientist Ewan Birney from

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[655] Andrews, "The Gene Patent Dilemma: Balancing Commercial Incentives With Health Needs", op cit.

[656] Thompson, N. "May the Source Be With You", *Washington Monthly*, July/August 2002. http://www.washingtonmonthly.com/features/2001/0207.thompson.html

[657] Cukier, K. "Open Source Biotech: Can a non-proprietary approach to intellectual property work in the life sciences?" *The Acumen Journal of Life Sciences*, Vol.1, No.3. September/October 2003. http://www.cukier.com/writings/opensourcebiotech.html

[658] J. Sulston, "Intellectual Property and the Human Genome", *Global intellectual Property Rights*, op cit, pp.561-73.

[659] Burk, Dan. 2002. "Open Source Genomics", *Boston University Journal of Science and Technology Law, Vol.* 8 , Symposium on Bioinformatics and Intellectual Property Law, April 27, 2001, Boston, Winter 2002, p.254.

the European Bioinformatics Institute commented that "*For us, it's straight scientific principles. If you want to be a scientist, open up your data and open up the code that helps you work with that data*."[660]

The implications for developing countries are easy to see. Protected biotechnology research could lock away valuable technological applications for developing countries. For example, some data that can be found in a proprietary database could only be accessed through a subscription fee, costing money that researchers in poor countries cannot afford. Similarly, patented biotechnological applications could lock away valuable applications in agriculture, genetics and health, with institutions in developing nations having to purchase licences in order to use the research. On the other hand, research that has been made available through a copyleft licence could be accessed, used, modified, copied and distributed by researchers for non-proprietary purposes. Carlson comments that "*As open-source biological manufacturing spreads, it will be adopted quickly in less developed economies to bypass the first world's investment in industrial infrastructure*."[661]

Open biotechnology remains one of the best existing tools to ensure that developing countries have access to high-technology in the area of biotechnology, but it would also allow them to protect their own low-technology from misappropriation through biopiracy patents. Protecting indigenous technology through an open access licence would allow LDCs to generate "benefit sharing"[662] of knowledge that is subject to commercial exploitation. . Benefit sharing is defined as:

> *"…all forms of compensation for the utilisation of genetic resources whether monetary or non-monetary, and includes, in particular, the participation in scientific research and development on genetic resources, and the making available of the findings of such scientific research and development and the transfer of technologies."*[663]

It is clear to see how non-proprietary licences could be used to achieve this goal. Knowledge could be made available to the public, but protected by copyleft licences to achieve the goal of

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[660] Williams, S. "I Hack the Body Electric", *O'Reilly Network*, July 25, 2002. http://www.oreillynet.com/lpt/a/2580

[661] Carlson, R. "Open-Source Biology and Its Impact on Industry", *Spectrum Online*, May 2004. http://www.spectrum.ieee.org/WEBONLY/resource/may01/spea.html

[662] For more on benefit sharing, see: Dutfield, G. "Sharing the benefits of biodiversity: is there a role for the patent system?" *Journal of World Intellectual Property,* Vol.5, No.6, November 2002, pp.889-933.

[663] Hemmati, M. "Access and Benefit-Sharing: Relevant International Agreements and Issues for Dialogue Between Stakeholders*". Paper for the Joint UNED Forum and Novartis International Side Event*, UNCTAD 8th Session, May 2000, p.3.

maintaining the knowledge in the commons and providing benefits to the originating communities.

2.2.2 Open health

The open biotechnology movement is in its very early stages, and the translation of licences from software development into the scientific field has been slow. The last section demonstrated that there is already some theoretical discussion about how this may be achieved, but so far, no actual licences have been drafted. This may be about to change with several concrete proposals geared towards the use of non-proprietary licences in health research, and in particular in the development of medicines.

Previous chapters have explained how the justifications for the patent system apply best to pharmaceutical research and development. Instinctively, it would be difficult to see how open licenses could be used to fund expensive pharmaceutical research, and it has usually been thought that this can only be done through patents. However, recent proposals have attempted to undermine such traditional arguments and provide some workable open health projects.

The problem of the under-funding of research into tropical diseases has already been explained. This lack of resources has prompted the creation of "virtual pharmaceutical companies", in which some pharmaceutical companies enter into collaboration and research agreements with academic institutions to be able to research and develop medicines that can tackle tropical diseases – this collaboration allows companies to fund otherwise unprofitable endeavours.[664] However, some have criticised that virtual pharmaceutical companies are not enough to tackle the problem, and that under funding is still a problem in this area.[665]

Maurer et al.[666] propose the creation of a new research body called the Tropical Disease Initiative (TDI), a body that would coordinate all research and development of tropical diseases and could come up with raw data that can be easily exchanged by researchers around the world – this would be done through the publication of findings to the public domain. The authors call this type of development "open source drug delivery", but are adamant that the results should go into the public domain. When the paper explains the manner in which this project can be

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[664] Most tropical diseases are now funded in this manner. See: Wake, S & Ridley, R. "Virtual Drug Discovery and Development for Neglected Diseases Through Public-Private Partnerships", *Nature Reviews: Drug Discoveries*, Vol.2, No.11, 2003, pp.919-928.

[665] Maurer, S; Rai, A. and Sali, A. "Finding Cures for Tropical Diseases: Is open source an answer?" *Biotechnology: Essays From Its Heartland*, Ed: Yarris, L. ed; BASIC Report, 2004, pp.33-37.

[666] Ibid.

taken forward, there is little or no consideration about licences or the eventual legal ownership of the research, which may stem from a misunderstanding of what open source means in legal terms.[667] The term open source here is then used more in the *Bazaar* sense of development, rather than the legal sense of open source licences. This means that while the proposal is very valid and noteworthy, it may be plagued by the same problems that have plagued other releases of research into the public domain. Further proposals into pharmaceuticals and open access must provide some practical legal solutions.

In a more thorough effort, Hubbard and Love have released a paper in which they explore some alternative models of pharmaceutical research and development to produce new medicines.[668] Their list of models includes increased government funding; prizes in the shape of credit or research grants for researchers that release their work to the public domain; and the creation of R&D investment funds that use stock market investment to produce funds. This proposal uses the existence of free software as an example that alternative business models can work, but unfortunately it fails to make the point of how to translate FLOSS licensing ideals into the pharmaceutical industry. Although Hubbard and Love's argument may not connect directly with open access models, their proposal is important because they propose workable ways to fund the basic research and to generate incentives to companies to distribute their intellectual property to the public. This release would then be performed using open licences.

However, there is not yet a single proposal that provides a killer argument that will allow companies to relinquish existing licensing models in pharmaceutical arena. This is easy to understand taking into consideration the immense costs and profits involved. Why would a company release their intellectual property?

There are some circumstances in which a company may benefit from revealing their intellectual property in an open licence model, but these benefits may be indirect, or intangible. Firstly, a pharmaceutical company could greatly benefit from releasing an open licence of a product if they do not expect to benefit form the product itself, but they may have a stake in marketing complimentary or secondary products. Secondly, companies should never underestimate the advantage of the first-mover in a competitive environment. Thirdly, medicines released under an open licence would definitely encourage further innovation and improvements from other

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[667] This criticism of Maurer's misunderstanding of open source is shared by others. See: Hope, J. *Open source biotechnology?* http://rsss.anu.edu.au/~janeth/OSBiotech.html#93

[668] Hubbard, T. and Love, J. "A New Trade Framework for Global Healthcare R&D", *PLOS Biology*, Vol.2, No.2, 2004. http://www.plosbiology.org/plosonline/?request=get-document&doi=10.1371%2Fjournal.pbio.0020052

researchers and licensees; this would be in line with the creation of a Bazaar environment where research is freely exchanged and improved upon by the community. Fourthly, companies could benefit from considerable public good will and good publicity if they are seen to work for the public good.[669]

Nevertheless, all of the proposals and ideas that propel the open access movement will come to naught if no licences can be drafted that fit the open access model, or if the licences are erroneous, unenforceable or badly drafted. Some proposals for licensing will be discussed next.

3. The licensing paradigm

One of the problems exposed so far in the open access debate is that it has become clear that there is significant misuse and misunderstanding of the terms and definitions involved in the development system. It is common to read terms such as free software, commons, open source and public domain used interchangeably. There must be an understanding that besides the ideological and philosophical connotations of each term, the heart of the movement is the distribution of intellectual works through permissive licences.

Open access has to be based upon adequate licences. Without licences, the movement is just a project management technique that encourages the use of peer-review. The free software and open source software movements have shown the way to follow regarding licensing agreements. The starting point for non-software licences will be to learn from the experiences in non-proprietary software development.

If the open access licences are to work, they need the intervention of the legal community to draft new licences that may apply to scientific research. The licences tend to be specific to software development, and in many instances they have been drafted by software engineers with little or no intervention of the legal community.[670] Furthermore, the some software developers appear to display considerable reluctance about external intervention in the decision process regarding licensing decisions.[671]

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[669] These ideas have been reworked from a set of recommendations by Janet Hope. See: Hope, *Open source biotechnology?* Op cit.

[670] Stallman is generally attributed as the author of the GPL, but Professor Eben Moglen provided legal assistance. See: Moody, *Rebel Code*, op cit, p.26.

[671] Tsiavos, P. "The (dis)illusions of a rebel: A reappraisal of the General Public License through techno-organizational analysis", *BILETA Annual Conference*, Durham, 25-26 March, 2004.

3.1 Sorting the open access clutter

The most prevalent open access licences are those offered by the Creative Commons project, which allows the creation of licences for creative works subject to copyright protection. The interesting part of the CC licensing environment is that it empowers users because there is a wide range of licences to choose from their website. Creators and authors need to go to a drop-down menu and choose from different options offered, and the system chooses the licence that fits the parameters entered. These licences range from offering the work straight to the public domain, to licences akin to the copyleft GPL model.

Creative Commons licences maintain a minimum set of standards that are met by all of their offered legal documents, with the exception of the one that offers the work to the public domain. This works in line with the minimum set of standards that exists in non-proprietary software definitions such as the Free Software Definition and the Open Source Definition studied in the previous chapter. This could be called the Creative Commons Definition, but it is generally known as the CC baseline rights.[672] All CC licences will provide these baseline rights are:

- Licensors retain their copyright; this explains why the baseline rights do not apply to public domain offerings.
- The licences announce that fair use rights are not affected by the licence. This is a curious statement, as it should be assumed that any clause that erodes acquired fair use or fair dealing rights should be specified in the licence.
- Licensees will have to obtain specific permission to perform one of the acts restricted by the licence. For example, if the licence does not allow modification or adaptation of a work, this action could only be performed with the permission of the owner. This seems to be a redundant statement, as this is an action that is usually understood in all licences.
- Copyright notices should not be removed from all copies of the work.
- Every copy of the work should maintain a link to the licence.
- Licensees cannot alter any terms of the licence. This seems to be yet another redundant clause, as it should be understood that this is common licensing practice.

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[672] Creative Commons. *Baseline Rights*. http://creativecommons.org/learn/licenses/fullrights

- Licensees cannot use technology to restrict access to the work. This baseline right specifically forbids the use of digital rights management tools.[673]
- Licensees are granted the right to copy, distribute, display, digitally perform and make verbatim copies of the work into another format.
- The licences have worldwide application, have lasts for the entire duration of copyright (unless otherwise specified), and are irrevocable.

It is important to note that the baseline definition of CC licences does not mention anything about modification or adaptation of a work; does not deal with copyleft-like clauses requiring the use of similar licences to distribute the work; does not mention attribution; and does not deal with the distribution of copies for commercial purposes. This makes the basic Creative Commons definition more alike to the open source ideals than to the free software principles exemplified by the GPL. Nevertheless, creators can choose a CC licence that maintains all of the restrictions mentioned, from all of the options offered. Authors then can choose from the following options to generate their licence:

- **Attribution:** The work is made available to the public with the baseline rights, but only if the author receives proper credit.
- **Non-commercial:** The work can be copied, displayed and distributed by the public, but only if these actions are for non-commercial purposes.
- **No derivative works:** This licence grants baseline rights, but it does not allow derivative works to be created from the original.
- **Share-Alike:** This is based on copyleft principles. Derivative works can be created and distributed based on the original, but only if the same type of licence is used, which generates a viral licence.[674]

It is possible to have licences that combine different of these options. The strongest CC licence is the Attribution-NonCommercial-ShareAlike License,[675] which is the licence that most resembles the GPL in the type of rights offered. All CC licences are presented in three formats: the first is a short and easy to read "Commons Deed", which explains the terms and conditions of the licence in a simple manner; the second format is the "Legal Code", which is the full

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[673] For more about DRMs, see: Dusollier, S. "Electrifying the fence: the legal protection of technological measures for protecting copyright", *European Intellectual Property Review*, Vol.21, No.6, 1999, pp. 285-297.

[674] Creative Commons. *Choosing a License*, 2003. http://creativecommons.org/learn/licenses/

[675] Version 2.0 can be found here: http://creativecommons.org/licenses/by-nc-sa/2.0/

licence; the third is the "Digital Code", which provides an HTML version of the licence[676] that can be read by search engines and makes it easier to list the content in the Creative Commons directory.

Creative Commons presents a very positive step towards the wider distribution of non-proprietary technology. It is innovative, thoroughly planned and greatly implemented. CC delivers open access licences in the digital domain with scalability, adaptability and ease of use for those unfamiliar with the legal issues involved in licensing. CC offers a great tool for individual creators or small enterprises that do not have the money to pay expensive licensing drafting services, and their services fare well even when compared to some proprietary or fee-based licence services available online.[677]

The other major open content licence is the GNU Free Documentation License (GFDL),[678] which is GNU's non-software licence, and is generally used to protect manual and other literature related to the free software movement, but it is also used in other open access projects, such as Wikipedia. The GFDL is similar to the GPL, hence it could be classified as a copyleft licence, but it has some important distinctions. The main difference is one of length and style, as the GFDL is clearer and more concise than the GPL, lacking some of the verbose ideological statements that are characteristic of the copyleft software licence. The other main difference can be encountered in paragraph 2 of the licence, which states:

> *"You may copy and distribute the Document in any medium, either commercially or noncommercially, provided that this License, the copyright notices, and the license notice saying this License applies to the Document are reproduced in all copies, and that you add no other conditions whatsoever to those of this License."*

This is different to the GPL because that allows copying and distribution of the source code mostly for non-commercial use, with the exception that a charge can be done to cover the costs of transferring the software into physical form.[679] The GFDL allows for the modification and translation of the work, provided some specific sections are maintained or deleted; and all

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[676] In fact, the code uses Resource Description Framework (RDF) metadata. For more about RDF, see: http://www.w3.org/RDF/

[677] Such as the Free for Education (FfE) project, which offers some licences commercially. See: http://www.aesharenet.com.au/FfE/

[678] The full text of the licence can be found here: http://www.gnu.org/copyleft/fdl.html

[679] GPL, para 1.

derivative works must be licensed using the GFDL.[680] This clearly means that this is a copyleft licence, perpetuating itself through this viral clause.

The viral nature of the GFDL can be seen in practice through the wide copying and dissemination of Wikipedia articles, which are being used by many other open content providers. For example, Wikipedia articles are now used in many other content providers, such as The Free Dictionary.[681] The articles found in this online resource have to be licensed through the GFDL, allowing yet another third party to copy them and use them in their website, provided that they use the GFDL.

With so many creative works that may be subject to be protected by open access licences, it should come as no surprise that there has been a recent proliferation of licences that allow commercial and non-commercial content creators to adopt the non-proprietary open access model. One such project is the OpenContent Licence (OPL), a collaborative effort that sets a copyleft licence, ensuring that shared works will continue to remain free to subsequent users.[682] Similar efforts also include music creation via the Open Audio Licence (OAL)[683] the SCRIPT-ed Open Licence (SOL),[684] and even Open Cola, the world's first copyleft fizzy drink.[685] It seems that access to content online is now ensured through the use of these open access licences. But what happens with scientific works?

3.2 Trouble with patents

All of the aforementioned licences have one thing in common, they protect only copyright works, which leaves open the question of what licences are available to protect scientific works, such as biotechnology and health research. It is important to note that despite the many scientists and researchers advocating the implementation of open licensing models to the scientific arena, it is difficult to find a scientific equivalent to the GFDL or the Creative Commons licences.

The reason for the lack of open science licences is that there may be some problem in porting a licensing model that has been designed to work with copyright into a system that would have to

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[680] GFDL, para 4.

[681] http://encyclopedia.thefreedictionary.com/

[682] The licence can be found here http://www.opencontent.org/opl.shtml

[683] This can be found here: http://www.eff.org/IP/Open_licenses/eff_oal.php

[684] http://www.law.ed.ac.uk/ahrb/script-ed/sol.htm

[685] Lawton, G. "The Great Giveaway", *New Scientist*. http://www.newscientist.com/hottopics/copyleft/copyleftart.jsp

work with other types of intellectual property protection. At present, patenting is the best way to protect scientific works, but this would mean that the scientist posting their research to the public would have to obtain patent protection for it first, which can prove to be an expensive endeavour. Some studies estimate that an average biotechnology patent application could cost an average $7,500 USD on legal fees alone.[686] The enforcement of patents is even more expensive,[687] which would mean that even if a research institution would be able to protect their research through patent, the right holders would find it extremely expensive to defend their intellectual property against misuse – particularly considering that most of these patents will be awarded to small research institutions or even to individual researchers. The problem would be more pronounced for researchers in developing countries, as they would possibly have to enforce patents abroad.

However, there may be a viable solution for the problem of the enforcement of patents held by individual organisations. The problem of enforceability of free software is similar to what has been described, as many software developers do not have the resources to enforce their copyrights. For that purpose, the FSF recommends to all those programmers using the GPL that they should assign copyright ownership of their works to the FSF because in that way they can enforce the licence better in case of infringement.[688] This could be replicated in future open science licences. Collective organisations, foundations or NGOs could be in charge of the enforcement of research held by individuals.

Another possible problem about the use of open source models in biotechnology research is that it could be considered to be incompatible with existing patent policy goals. The stated goal of a patent system is to encourage the distribution of inventions through the utilitarian justification that allows for economic reward. An open access model might clash with this stated goal because it would stop inventors from being able to economically recuperate investments in future research related to the patented one, particularly if a copyleft licence is used.[689] For example, imagine a gene sequence that is patented and then licensed through a copyleft licence containing share-alike restrictions. Researchers who would want to use the sequence in the

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[686] For more about the economics of the patent system, see: Granstrand, O. *The Economics and Management of Intellectual Property: Towards Intellectual Capitalism*, Cheltenham: Edward Elgar Publishing House, 2000, Chapter 3.

[687] For a comprehensive list of literature dealing with the costs of patent enforcement, see: http://www.patenting-art.com/economic/economic.htm

[688] E. Moglen, Why *the FSF gets copyright assignments from contributors*. http://www.gnu.org/copyleft/why-assign.html

[689] Cooper Feldman, R. The *Open Source Biotechnology Movement: Is it Patent Misuse?* SSRN Working paper, May 2004. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=545082

future would have to use similar licences to the one with which they acquired access to the sequence in the first place. This would mean that they would have to license their research using a copyleft clause as well.

Taking into consideration all of these difficulties, it should come as no surprise that most biotechnology information that is now being made publicly available online is being released into the public domain, as was the case with the human genome. The exception to this rule is the International HapMap Project Public Access License,[690] which is part of the HapMap genetic database project. An interesting feature of this document is that it is not an intellectual property rights assignment licence; it reads more like an end user licence agreement as it must be agreed upon registration and before gaining access to certain parts of the HapMap genetic database. The wording of the licence makes it appear to be an intellectual property assignment of rights, but it is not entirely clear what rights are held over the data that is being offered. For example, the work is clearly offered as a database, but the United States does not have a database right.[691] One could assume that the work could be offered as a copyright work, but this would have the troublesome implication that one could actually copyright the actual letters of the human genome, a solution that seems absurd.[692] Nevertheless, the wording of the HapMap licence is very careful not to assign intellectual property rights, so it must be assumed that it is just a user agreement. This can be seen when paragraph 3 of the licence states that "*You may not access, copy, modify, sublicense, distribute or otherwise use the Genotype Database or the data contained in it except as expressly provided under this License*." The most relevant part of the HapMap licence is with regards to future patent applications. Paragraph 2(b) of the licence does not allow the patenting of genetic information from the database, with the exception of particular uses of sequences, provided that the patent allows further use of the information obtained from the database.

The HapMap licence offers an ingenious way of getting around the problems of patent protection enumerated above, as it relies on contractual obligations more than on intellectual property protection, and may prove to be the way to go as far as open science licences are concerned. This can be evidenced by the wording of the Science Commons documentation,

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[690] The licence can be found here: http://www.hapmap.org/cgi-perl/registration

[691] For more about the European database right, see: Colston C. "Sui Generis Database Right: Ripe for Review?" *Journal of Information, Law and Technology*, 2001 (3). http://www2.warwick.ac.uk/fac/soc/law/elj/jilt/2001_3/colston/

[692] For more about genetic database protection, see: Baba, E. "From Conflict to Confluence: Protection of Databases Containing Genetic Information", *Syracuse Journal of International Law and Commerce*, Vol. 30, 2003, p.121.

which enumerates the problems caused by database and patent protection of genetic research but does not say that the solution is to offer a patent licence, mush in the way in which the CC licences are copyright assignments.[693] The Science Commons proposal goes as far as stating that "*Many of the things that we have learned in forming the Creative Commons do not translate completely to the world of science policy. We dealt primarily with copyright - here the issues would also involve patent and trade secret*."[694]

Apart from the two solutions enumerated, the tackling of the patenting problem is short in suggestions, as most of the proponents of the open biotechnology movement usually fail to tackle the question. As an exception, Cukier suggests that patenting problems could be overcome through the use of policy by applying existing national interest patent defences that are already in use in the United States in the area of defence and health.[695] Another solution may be found in other open access licences and open source software licences. It would be possible to change the wording of existing open access licences to specify generic intellectual property assignment instead of specific copyright provisions.[696] Another solution would be to include a patent assignment in all open access works. This is already being done in some open access licences, such as is the case with the Apache Licence (version 2.0), which contains a patent assignment clause.[697]

4. Validity of open access licences[698]

The discussion in this chapter has been centred so far upon the possible application of the non-proprietary software model into other areas of endeavour. However, recent legal developments have moved the debate of the open access movement from the philosophical and economic implications of the model, to a strictly legal one. There have been a surprisingly small number of court cases generated by these licences – something that will undoubtedly change with the legal battle started by SCO – so a full study of the eventual validity or invalidity of the

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[693] Creative Commons. *Science Commons proposal*. http://creativecommons.org/projects/science/proposal

[694] Ibid.

[695] Cukier, "Open Source Biotech", op cit.

[696] See Appendix x.

[697] See Appendix y.

[698] The arguments in this section were first elaborated here: Guadamuz, A. "Viral contracts or unenforceable documents? Contractual validity of copyleft licenses*", Mobile IPR Proceedings*, Helsinki Institute for Information Technology HIIT, August 2003.

contractual copyleft clauses must be subject to an analysis by the academic community, something which has not been forthcoming in this side of the Atlantic.[699]

This section will explore the validity of the GPL, because it offers the strongest non-proprietary licence. Although this means that the analysis will go back to the software arena, it is in software development where the legal test of the movement is taking place, so the lessons learnt by this movement may be translated to the younger licences. This analysis will be done from a broad European perspective. There are reasons to evaluate the validity of copyleft licences from a European contract law perspective because many principles vary from the American approach. Other legal aspects, such as the competition law and the copyright aspect of the protection of GPL works will be analysed as well, as they vary in some aspects to the American approaches.

4.1 Validity matters: SCO v IBM

Until recently, there had been no court cases against non-compliance with a copyleft licence, and the few incidents that have arisen had been dealt swiftly with cease-and-desist letters to those parties suspected of producing proprietary software.[700]

This all changed when a developer of non-proprietary database software named MySQL sued NuSphere – a software company that it believed was using its source code to produce proprietary software – something that contravened the terms of the GPL.[701] This file was issued in response to a suit filed by NuSphere claiming "*breach of contract, tortious interference with third party contracts and relationships and unfair competition*."[702] Unfortunately this case was settled out of court; hence the GPL did not receive a judicial review in this occasion. However, this was only the opening shot in what is set to become one of the largest and most complex legal battles that the software industry has ever seen.

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[699] This is not the case in the United States, where there has been some interesting work in this area. See for example: Gomulkiewicz, R. "De-Bugging Open Source Software Licensing", *University of Pittsburgh Law Review,* Vol. 64, Winter 2002, p.75; Ravicher, D. "Facilitating Collaborative Software Development: The Enforceability of Mass Market Public Software Licences", 5 *Virginia Journal of Law and Technology,* Vol.5, 2000, p. 11; Kennedy, D. "A Primer on Open Source Licensing Legal Issues: Copyright, Copyleft and Copyfuture" 20 *St. Louis University Public Law Review*, Vol.20, 2001, p.345; and Nadan, C. "Open Source Licensing: Virus or Virtue", *Texas Intellectual. Property Law Journal*, Vol.10, 2002, p. 349.

[700] G. Moody, op cit, p..313.

[701] A FAQ about the case can be found here: http://www.mysql.com/news/article-75.html

[702] Ibid.

The legal question about the validity of copyleft licensing models broke spectacularly in legal circles in March 2003 when the SCO Group – a well known software developer of UNIX related products – filed a lawsuit[703] against IBM alleging that the company was infringing its intellectual property over the UNIX kernel.[704] The full details of the suit are still sketchy because SCO is keeping some of the most detailed information of the code they allege to have been protecting as a close secret, not letting it be known which part of the code it claims ownership of.[705] However, it is known that SCO claims that back in 1985 AT&T and IBM signed a contract to produce a version of UNIX called AIX. In 1995, SCO purchased all of the intellectual property related to UNIX from AT&T, hence the claim they have filed against IBM. It would seem that SCO is somehow making claims that they own part of the code for AIX, or that they own some other part of the UNIX kernel code that is used in most machines running Linux distributions. Furthermore, SCO threatened to sue every corporate Linux user for copyright infringement,[706] claiming that any Linux user must purchase a licence from them. This threat finally came to fruition in March 2004 when they sued DaimlerChrysler and auto parts retailer AutoZone, two corporate Linux users.[707] As a result of this action, IBM countersued SCO claiming that the company has been infringing its own copyrights and patents, and also alleging that SCO is in violation of the GPL because they are users and modifiers of the Linux kernel, which is licensed with the GPL.[708]

It is too early to ascertain the strength of SCO's arguments, but it has become clear that this case has increased the stakes in the financial importance of copyleft licences, and hence the importance in making sure that the licence terms are valid.[709] Nevertheless, SCO's arguments should be met with considerable scepticism given the nature of the development of UNIX and Linux described in the previous chapter. It will be very difficult for SCO to prove ownership of some code that was developed under an atmosphere of collaboration, and that may date as far

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[703] *Caldera Sys., Inc. v. Int'l Bus. Machs. Corp.* (D. Utah 2003) (No. 03-CV-0294).

[704] Galli, P. "SCO Group Slaps IBM With $1B Suit Over Unix", *E-Week*, March 10, 2003. http://www.eweek.com/article2/0,3959,922913,00.asp

[705] J. Harvey and T. McClelland. "SCO v. IBM: The Open Source benefits and Risks are Real", 20:9 *Computer & Internet Lawyer* 1 (2003).

[706] Galli, P. "SCO Warns Linux Users of Legal Liability", *E-Week*, May 14, 2003. http://www.eweek.com/article2/0,3959,1149623,00.asp

[707] Weiss, T. "SCO Sues Two Linux Users, Warns About Further Action", *Computerworld*, March 8, 2004. http://www.computerworld.com/softwaretopics/os/story/0,10801,90868,00.html?f=x72

[708] Goettsch, K. "SCO Group v. IBM: The Future of Open-Source Software", *University of Illinois Journal of Law*, Technology & Policy, Fall 2003, pp.581-588.

[709] The most recent developments in this case can be followed here: http://www.groklaw.net

back as 1969. Another aspect is that one should assume that the timing in this case counts. Why did SCO wait until now to exercise their intellectual property rights? Could this have to do with the fact that SCO's share price has quadrupled since this case made the headlines?[710] One also must be suspicious of the fact that Microsoft has obtained a Unix licence from SCO, which has prompted repeated accusations that SCO may be in league with Microsoft to destroy Open Source development.[711] However, it could be argued that even if some of the code was found to be property of SCO, the existing users could claim an implied licence due to the lack of enforcement for more than a decade.

4.2 Contractual issues

4.2.1 Contract formation

Contractual formation is a problem that has been addressed by contract law since Roman times, and the rules controlling them tend to vary from one jurisdiction to another. Although some basic rules of contract formation are common to most jurisdictions, such as the basic requirements about the capacity to contract, and requirements about offer and acceptance,[712] the specifics of contract formation tend to be varied. This makes the analysis of contract formation of agreements that are entered into at an international level difficult to analyse, but a simple analysis of how electronic contracts are being dealt with may help to provide light in this difficult topic.

Contracts that are offered online tend to take two different shapes, click-wrap agreements and browse-wrap agreements. Click-wrap agreements originate from another type of agreement called a shrink-wrap agreement.[713] Click-wrap agreements are generally to be found in software that is pre-installed on a computer, or that is downloaded over the Internet. Upon downloading or installing the software, a window containing the terms of the licence opens for the user to read. The user is then asked to click either "I agree" or "I do not agree".[714] Browse-wrap (also known as web-wrap) agreements generally appear only as a hyperlink that is accessed by

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[710] For a chart of SCO's stock prize, see: http://stocks.tradingcharts.com/

[711] Olavsrud, T. "Microsoft Buys Into SCO Group's Unix", *Internet News*, May 19, 2003. http://www.internetnews.com/dev-news/article.php/2208691

[712] Poole, J. *Contract Law*, 6th Edition, London: Blackstone Press, pp.25-27.

[713] Radin, "Humans, Computers, and Binding Commitment", op cit.

[714] These are licences that contain their terms and conditions in the outside of a shrink-wrapped package and obligate those who open it to abide by those obligations. See: Murray, A. "Entering into Contracts Electronically: The Real W.W.W." *Law and the Internet: A Framework for Electronic Commerce,* Edwards and Waelde (eds), Oxford: Hart Publishing, 2000, pp.17-36.

clicking on it, and are generally located at the bottom of the page.[715] Both shrink-wrap and click-wrap agreements tend to be accepted nowadays as valid contract formation.[716] The problem has been taking place in the area of browse-wrap agreements, as some courts in the United States have found some problems with the practice because there is no proper incorporation of terms.[717]

The relevance of web-wrap for the GPL is that this licence is not offered through a click-wrap formation, but it only requires that a notice about the licence and about the ownership of the program be provided with the source code.[718] However, this may prove problematic because it may not be obvious where exactly the notice is located. It would be easy to imagine how a court could find that the licence was not properly displayed to the attention of the user, and then it could be possible that a ruling would say that there is no contract.[719] Proper care should be taken by creators and licensors to make sure that the licence is clearly noticeable and that the terms and conditions are properly marked. Mere references to the licence in the source code may not fulfil this.

There may be another problem of contract formation with the GPL under English law. English contract law contains the requirement of consideration of an acceptance. The consideration doctrine means that a contract is enforceable only if there is some form of reciprocity involved in the contract, often categorised as a form of payment.[720] It could be argued that the GPL does not fulfil consideration doctrine under English Law as there is no payment involved. Although this debate is generally considered an idiosyncrasy of English Law, it must be pointed out that the courts have often found that monetary payment is not always what is required to fulfil the consideration requirement, and that other forms of reciprocity may be accepted.[721]

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[715] Kunkel, J.D. "Recent Developments in Shrinkwrap, Clickwrap and Browsewrap Licenses in the United States", *Murdoch University Electronic Journal of Law*, Vol.9, No.3, September 2002. http://www.murdoch.edu.au/elaw/issues/v9n3/kunkel93.html

[716] For shrink-wrap, see: *Step-Saver Data Sys., Inc. v. Wyse Tech.*, 939 F.2d 91 (3d Cir. 1991). For shrink-wrap, see: *Specht v. Netscape Communications Corp.,* 2001 WL 755396, 150 F. Supp. 2d 585 (S.D.N.Y., July 5, 2001), aff'd. -- F.3d -- (2d Cir., Oct. 1, 2002).

[717] See: *Hotmail Corporation v. Van Money Pie Inc., et al.*, C98-20064 (N.D. Ca., April 20, 1998).

[718] GPL, para 1; and final recommendation section.

[719] Nadan, op cit; p.362.

[720] This doctrine and interpretation are under considerable debate, see: Treitel, G. *The Law of Contract*, 10th Edition, London: Sweet and Maxwell, 1999.

[721] Particularly, see: *Williams v. Roffey Bros. & Nicholls (Contractors) Ltd* [1991] 1 QB 1.

4.2.2Unfair terms

The second contractual concern for the consideration of the validity of copyleft clauses must be to ask if they are unfair according to European consumer protection legislations. Most jurisdictions have different public policy restrictions to contractual terms, the most common being restrictions against terms that will give away basic human rights,[722] but beyond these basically recognised principles, the range of restricted or excluded terms varies from one jurisdiction to another.[723] It is because of the wide variation in this area of contract law that the European Union felt the need to harmonise the different approaches to unfair terms across member states. Consumers in the EU are now subject to a wide-ranging regime designed to protect them from unfair terms in a variety of circumstances in which they are presented with pre-formulated standard contracts, a regime implemented in the Unfair Terms in Consumer Contracts Directive (the Directive),[724] which specifies what an unfair contractual term is, and sets a number of considerations by which clauses will be analysed to test for unfairness. The directive also provides a non-exhaustive list of some terms that will be considered unfair, one of which applies directly to copyleft licences.

The GPL contains several different clauses that may be considered in light of the existing unfair terms legislation. The most likely candidate for this is the limitation of liability expressed in paragraphs 11 and 12 of the licence. These sections are the ones most likely to be found unfair as the Directive is specific about the inherent unfairness of such clauses,[725] so and likely to receive the same analysis as those in European courts.[726]

The main question then is to analyse whether or not the copyleft clause included in the GPL is unfair or not. There are many issues to consider when asking this question. The first one is whether the licensee of GPL protected software should be considered a consumer as understood by the definition provided by Art. 2(b) of the Directive, which states that a consumer will be any natural person who "*is acting for purposes which are outside his trade, business or*

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[722] Radin, op cit.

[723] In the UK for example, the Unfair Contract Term Act 1977 (UCTA) contains an exhaustive list of unfair terms, which include exclusion, limitation and indemnity clauses.

[724] Council Directive of 5 April 1993 93/13/EEC on unfair terms in consumer contracts, O.J. No. L95/29, 21.4.1993. The directive has already been implemented in the UK in the shape of the Unfair Terms in Consumer Contracts Regulations 1999 (UTCCR).

[725] Directive 93/13/EEC, Annexes (a) and (b).

[726] For more on exclusion of liability terms, see: Lawson, R.G. *Exclusion clauses and unfair contract terms*, 6th edition, London: Sweet & Maxwell, 2000.

profession". This is a very broad definition of consumer, and even though the wording of the Directive would seem to exclude legal persons, it must be underlined that courts have generally taken a very broad interpretation as to what a consumer is, even to include companies.[727] The common interpretation of this requirement will be that the person entering into a standard contract – such as a software licence – will be considered to be a consumer if they are not signing the contract as the regular course of dealing in that business. It would be fair to assume that if a software firm develops a software programme and licenses it to another software firm using the GPL, the licensee firm will probably not be considered a consumer for the purposes of the Directive. On the other hand, an individual consumer who has acquired some copyleft licensed software could possibly make a strong case arguing that he is signing the licence as a consumer. This is of course a general interpretation, and the circumstances of each contract must be individually determined on a case-by-case basis.

Assuming that the licence is considered to be a consumer contract as described, there is still a need to determine whether the term itself is unfair. Art. 3(1) of the Directive specifies that:

> *"A contractual term which has not been individually negotiated shall be regarded as unfair if, contrary to the requirement of good faith, it causes a significant imbalance in the parties' rights and obligations arising under the contract, to the detriment of the consumer."*

A term will be considered not to have been negotiated individually if it has been drafted in advance and the consumer did not have a say in the terms of the final contract.[728] This definition is at the heart of any contractual dispute that may arise by the application of the Directive, and its interpretation is the one that offers more problems as it can be considered as using a very open-ended requirement, such as the often nebulous expression 'good faith'. In the UK, the test for unfairness as expressed by the Directive has been established by *Director General of Fair Trading v. First National Bank plc*.[729] According to this ruling, the consumer must prove that there has been bad faith on the part of the undertaking in the drafting of the contract, that there is a significant imbalance to the obligations and powers of the parties, and that such imbalance must be detrimental to the consumer. The court in this ruling specified that good faith would be present if the contract was signed with fair and open dealing. Openness means that the term

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[727] Most recently in the UK one can find examples of this in *SAM Business Systems Limited v Hedley & Co.* [2002] EWHC 2733.There are several older examples of this, such as *R&B Customs Brokers Ltd v United Dominions Trust Ltd* [1988] 1 WLR 321; and even Cass. Civ. 1re, 28 April 1987. Most notably for software purposes are *St Albans City & District Council v International Computers Ltd* [1996] 4 All ER 481.

[728] Directive 93/13/EEC, Art. 3(2).

[729] *Director General of Fair Trading v First National Bank Plc,* [2001] UKHL 52; [2002] 1 A.C. 481.

must be clear, legible and not contain hidden pitfalls; and fair dealing would have to be understood that the supplier should not take advantage of the other party's relatively weak position. It is important to note as well that some commentators suggest that the concept of "good faith" should be understood in accordance to Civil Law principles,[730] and as such many different aspects must be taken into consideration, for example the gravity of the imbalance, the social position of the parties and the way in which the term in question came into existence.[731]

Analysing the copyleft clause with the requirements presented by this ruling, one could say that there appears to be an imbalance in the obligations of the parties as the licensee will have to use the GPL and cannot profit from derivative works. This imbalance could also be assumed to be detrimental to the consumer as it is imposing the responsibility of not being able to use the work in whatever way it is desired. However, one must say that this is precisely the same type of imbalance that exists in every other copyright-based software licences, and hence it would be difficult to find it unfair.

The main question will be in trying to determine if there has been good faith by the drafter of the licence. This is more difficult to ascertain given the test of good faith presented above. In the case of the GPL, the test does not appear to be met. The copyleft clause is clear enough, does not contain hidden pitfalls, and the software owner is not taking advantage of the relatively weak position either because the consumer is always free not to use the software if he so desires, and is even free to look for similar software that does not use copyleft licences.

Based on this brief analysis of the copyleft contract term and the existing European unfair contract legislation, it would seem that the GPL copyleft clause is valid, as there are too many uncertainties as to whether or not a court would interpret this clause in favour of a licensee on the basis of the existence of good faith. It must also be assumed that the copyleft clause will be valid as it does not fall into any of the specified unfair terms provided in the Annex to the Directive. However, the question must remain open until the first case testing the validity of this type of licence comes up. Given the amount of money involved in software development, it is likely that at some point copyleft will indeed receive some judicial review.

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[730] McKendrick, E. *Contract Law*, Fourth Edition, Basingstoke: Palgrave, 2000, p.369.

[731] Some of these principles in civil law can be seen in several continental cases, such as *Saladin/HBU*, Hoge Raad, NJ 1967.261 (G.J. Scholten). For a more complete work on the subject of good faith in Civil Law, see: Zimmermann, R. and Whittaker S. eds; *Good faith in European contract law*, Cambridge: Cambridge University Press, 2000.

4.2.3 Passing obligations to third parties

Another interesting legal issue that arises when considering the validity of GPL clauses is the problem of passing obligations to third parties. The legality of this practice is usually covered under the English contract law concept of the privity of contracts, of which there are two rules, one for passing burdens and one for passing benefits.

The first rule exists under traditional privity doctrine, where "*a third party cannot be subjected to a burden by a contract to which he is not a party*."[732] This general principle is still in effect in most jurisdictions and responds to the reasonable principle of legal security by not allowing parties to place contractual burdens that they are not aware of. Wherever this practice is permitted, it is usually well regulated.[733] The question must be asked of whether the GPL constitutes the imposition of a burden to third parties. The initial response would be negative, as the imposition of the clause is done on a one-to-one basis. If one does not agree with the copyleft clause, then it is only logical that one should not use the software; and certainly one should not use it to create a derivative product.

If the passing of burdens is generally not accepted in contract law, what happens to the passing of benefits? There is a second controversial privity rule in English law which does not allow a third party to benefit from the contract, although the rule has been largely modified in England as to render it practically inexistent.[734] It is important to point out that this second privity rule exists in Civil law jurisdictions,[735] where third-party rights (known in Scotland as *jus quaesitum tertio*), has been an integral part of contract law.[736]

The relevance of third-party rights to copyleft results in the question of whether the originator of a program licensed under the GPL may sue a licensee who is located further down the software distribution chain for breach of contract. Assuming that A is the software creator and B is the copyleft licensee and B licenses the software to C using the GPL; could A sue C for contractual breach if C does not comply with the copyleft clause? Contractually speaking, one

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[732] McKendrick, op cit; p.133.

[733] Radin notes for example where passing burdens are accepted in competition law and in public policy issues, see: Radin, op cit, p.135.

[734] This was done by The Contracts (Rights of Third Parties) Act 1999.

[735] And in mixed legal systems such as Scotland.

[736] In France for example, privity of contract is qualified by Art. 1121 of the *Code Civil*, which allows third party rights. In Germany, Art. 328 of the *Burgerliches Gesetzbuch* allows for the performance of rights by third parties. Another example can be found in Art. 2.115 of the Principles of European Contract Law, see: European Commission on Contract Law, *Principles of European Contract Law: Part 1: Performance, Non-performance, Remedies*, ed. O. Lando and H. Beale, 1995.

would have to assume that for A to successfully sue C; A must have a third-party right arising from the contract between B and C, which appears to be an invalid proposition.

The possible applicability of third-party rights to copyleft can be better understood in the famous Scottish case of *Beta Computers v Adobe Systems*.[737] In this case, Beta Computers provided a copy of software authored by a third party called Informix, for which they had a licence. The court in this case found that Informix – although not part of the contract between Adobe and Beta – had a third party right. This position has been adequately criticised by MacQueen, who says that when the subject of a software transaction is a licensing agreement, third-party rights cannot possibly apply as a licence grants rights **by** the third party, it does not create rights to the third party, which is the doctrinal requirement of third-party rights.[738] There cannot be much doubt that in the case of copyleft licences, the author's rights arise from the licence itself and the contractual provisions contained within. It will be seen later whether the author could sue under copyright providing the code has been copied without a licence, but it would be more difficult to state that the author could sue for a broken contractual term contained in the licence. The contractual validity of the copyleft clause would then work on a one-to-one basis, where only the two parties involved could sue each other and there would be no possibility of involving third parties, even if the third party is the author.

2.3 Copyright concerns

2.3.1 Copyright infringement

The analysis above would seem to indicate that the author or owner of a work that has been licensed using copyleft will find it difficult to sue subsequent users of the software down a distribution chain for contract breach. Yet, the question still remains on whether the author can sue for copyright infringement. The answer to this is much more straightforward than the contractual analysis.

Using the same example cited above, let's assume that A is the software owner and B is the copyleft licensee, and that B licenses the software to C using the GPL. C modifies the software and releases a proprietary version of it by closing the source code to subsequent users. Could A sue C for copyright infringement? The answer is a definitive yes, as copyright is less preoccupied with who licensed the software to C, but the emphasis would be whether or not C

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[737] *Beta Computers v Adobe Systems* 1996 SCLR 587.

[738] For an excellent attack to this ruling, see: MacQueen, H.L. "Software Transactions and Contract Law", *Law and the Internet: Regulating Cyberspace*, Edwards and Waelde (eds), Oxford: Hart Publishing, 1997.

is committing actions that would be considered as infringing A's copyright. The question then would become one of infringement and originality, possibly hindering on the question of whether or not C has done enough work to the original source code to be considered an original work.

This is a much better explored area of copyright law. Computer software is awarded copyright protection as a literary work if it is considered to be an original work.[739] The question of originality has been long discussed by the courts, but there is agreement that an original work is one that demonstrates the use of skill and labour by the author, in short, "*that it should originate from the author*"[740]. Even though the originality requirement states that the work should not be copied in its entirety, courts have recognised that certain amount of copying is acceptable. For example, copying of the drawing of existing designs has been deemed to be original in some instances.[741] When copying exists, the copying must fulfil the long standing qualitative test to determine whether the copying has been substantial.[742]

In computer software, the courts have been following the general qualitative test in cases of copying from another work. In both *Richardson Computers v Flanders*[743] and *Ibcos v Barclays,*[744] the courts found that if there had been any copying from a protected original work, that there had to be an analysis of whether such copying had been substantial. It is important to stress that the test is for qualitative copying, not quantitative. There will be some consideration about the quantity of the work copied,[745] but even if this is minimal it may result that the copying may be deemed to be substantial. This is evident in the case of *Cantor v Tradition*,[746] where copying of original source code took place from former employees of a financial services company. In this case, expert witnesses found that only 2% of the original source code had been copied, accounting for only 2,952 lines of code out 77,000.[747] The lines of code were deemed to

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[739] Section 3(1)(b) UK CDPA 1988.

[740] *University of London Press Ltd. v. University Tutorial Press Ltd.* [1916] 2 Ch. 601.

[741] For examples of this see: *The Duriron Company Inc v Hugh Jennings & Co Ltd* [1984] FSR 1; and *Interlego v Tyco Industries* [1989] AC 217; [1988] 3 All ER 949.

[742] Existing in common law since *Bleistein v Donaldson Lithography Co*, 188 US 239, 250 (1903).

[743] *John Richardson Computers Ltd v Flanders and Chemtec Ltd* [1993] FSR 497.

[744] *Ibcos ComputersLtd v Barclays Mercantile Highland Finance* [1994] FSR 275.

[745] For which software may result helpful in analysing the number of lines of code copied. Software such as MOSS: http://www.cs.berkeley.edu/%7Eaiken/moss.html

[746] *Cantor Fitzgerald International v Tradition (UK) Ltd* [1999] Masons CLR 157.

[747] Lloyd, I. *Information Technology Law*, 3rd Edition, London: Butterworths, p.411.

be of importance for some modules in the resulting software, but the copying was not considered substantial to grant the infringement case, but was enough for the copier to agree to take financial responsibility for the infringed code and offer to pay for it. Nevertheless, the fact that some of the copying was even considered in the ruling must send signals to potential copiers of non-proprietary software about their chances in court.

Given the state of the rulings in software copyright infringement, it appears that if a copyright author or owner can prove to a court that a proprietary copy of their original software has been infringed, then it will not matter just how they obtained the software, and it will certainly not matter if they are further down in a chain of distribution. If a programmer uses substantial sections of code belonging to a copyleft program, that programmer will still be subject to legal action by the author.

2.3.2 Moral rights

Moral rights could pose significant problems for the application of licences that allow the modification and adaptation of works, hence becoming more important to non-proprietary licences than it would appear at first glance. The reason for this is that most non-proprietary licences are drafted in the United States, where moral rights are not particularly observed because they tend to be alien to common law systems and, and are generally better applied in civil law traditions.[748] Even the most ardent proponents of copyleft licences tend to recognise that there are possible problems with moral rights and non-proprietary licences. Talking specifically about the GPL, Eben Moglen admitted that "*There are contexts where a subject in a moral rights system might change how the GPL is applied*".[749]

It has already been mentioned in earlier chapters that moral rights are more prevalent in two forms the right to have the work attributed to the author (paternity) and the right to object to derogatory treatment (integrity). The right of integrity is the one that presents more problems to copyleft licences, but there may be problems with the paternity right in some jurisdictions. Article 6bis of the Berne Convention specifies that "*the author shall have the right to claim authorship of the work and to object to any distortion, mutilation or other modification of, or other derogatory action in relation to, the said work, which would be prejudicial to his honor or reputation*." The implications to viral licences of the strict reading of Berne should be evident,

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[748] Sundara Rajan, M. "Moral Rights in Information Technology: A New Kind of 'Personal Right'?", *International Journal of Law and Information Technology*, Vol.12, No.1, 2004, pp. 32-35.

[749] Reid, R. "Canadian law in conflict with aspects of GPL", *Computerworld*, May 12, 2004. http://www.computerworld.co.nz/news.nsf/UNID/A2FF80DE9D37B709CC256E91006968F5

as authors maintain the right to object to certain modifications in countries that apply the Convention. This would mean that authors could object to adaptations of works licensed through copyleft licences, even if these adaptations are permitted in the licence. However, there is room to argue this point, particularly in software, as it is generally understood that moral rights have very limited application to software even in civil law systems, and they are generally considered to be invalid in software in the United States.[750] Others have commented that there are doubts about the applicability of moral rights in digital environments[751] because of the malleability of content, where as it would become extremely difficult to police the integrity right with a medium where changes are one click away.

Regardless of the possible arguments against the use of moral rights in software, moral rights would still pose serious problems to other open access licences based on the copyleft model. An example of the problematic application of moral rights to open access licences can be seen in UK copyright law. In the UK, the moral right of paternity (or attribution) must be asserted.[752] Most open access and copyleft licences tend to emphasise on the right of attribution, such as the Creative Commons licences, and therefore they must contain the assertion, as it already does. However, in the UK the attribution right only applies to literary, dramatic, musical and artistic works and films,[753] which means that sound recordings and broadcasts are not subject to this right. This could affect open access licences that are used to protect such works.

The moral right of integrity could also prove problematic in the UK. According to the CDPA, derogatory treatment is "*distortion or mutilation of the work or is otherwise prejudicial to the honour or reputation of the author or director.*"[754] This wording seems incompatible with licences that allow adaptation of the original work because it would generate too many problems. What amounts to mutilation? Can an author really object to derogatory treatment if they implicitly allow adaptations of the work to be made by others? Does the licence constitute a waiver of this right? The CDPA specifies that the only right that needs to be asserted is the attribution right, while the right to integrity exists even without assertion. This would mean that all UK licences that do not want to provide an integrity right in the UK must contain a specific

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[750] Lea, G. "Moral Rights and the Internet: Some Thoughts from a Common Law Perspective", *The Internet and authors' rights*, Pollaud-Dulian, F. London: Sweet & Maxwell, 1999, p.98.

[751] De Souza, L. and Waelde, C. "Moral Rights and the Internet: Squaring the Circle", *Intellectual Property Quarterly*, No.3, 2002, pp.265-288.

[752] S 78 CDPA.

[753] Bainbridge, op cit; pp.98-118.

[754] S 80(2) CDPA.

waiver to make sure that the work is not protected by this moral right. There is a debate about whether moral rights can be waived at all,[755] but fortunately, the CDPA allows it.[756]

2.4 Competition law

There is one final area that may provide validity problems for copyleft licences. Even though these licences do not impose obligations to third parties as the licence is passed to a single licensee at the time, it is less clear whether such restrictions could be considered anti-competitive in accordance to European competition rules, as it could be found that the imposition of the copyleft clause, even if done on a one-to-one basis, could be found to be anti-competitive.

EC competition rules have a set of provisions that impose certain restrictions upon the passing of obligations through a distribution chain which may create anti-competitive restrictions on the recipient; this is evident in the regulation and implementation of competition law in the area of licensing and vertical agreements. Vertical agreements in the competition sense "*are those entered into between undertakings whose relationship is complementary, such as manufacturer and distributor or licensor and licensee*."[757] An example of a regulated vertical agreement is the existing set of restrictions in the area of technology transfer licensing, where a number of impositions down a distribution chain are blacklisted.[758]

There is an ongoing debate about the seriousness of vertical agreements that impose restrictions through a distribution chain, as economists in the 1980s started seeing vertical restraints in a positive light[759] despite some early emphasis by the European courts on clamping down on these types of agreements.[760] The debate has continued, with the official position steadily moving towards a less restrictive approach towards vertical restrictions. In fact, a Green Paper by the European Commission found that:

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[755] For example, Vaver believes that waivers to moral rights practically eliminate their strength entirely. See: Vaver, D. "Authors' Moral Rights: Reform Proposals in Canada: Charter or Barter of Rights for Creators?" *Osgoode Hall Law Journal*, Vol.25, 1987, pp.749-86.

[756] S 87 CDPA.

[757] Goyder, *EC Competition Law*, op cit; p.13.

[758] See: Commission Regulation 240/96/EC on the application of Article 85(3) of the EC Treaty to certain categories of technology transfer agreements, OJ 1996. L 31/2. For more on vertical restraints, see: Furse, M. *Competition Law of the UK & EC*, London: Blackstone Press, 1999, pp.104-112.

[759] Furse, op cit; p.105.

[760] See for example *Consten and Grundig v. Commission*, joined cases 56 and 58/64 [1996] ECR 299; CMLR 418.

> *"…distribution agreements raise special difficulties because they are usually something of a two-edged sword. They can be a useful way for a firm to penetrate a new market and to sell its products effectively. But they can also be used to prevent outsiders from entering a market, and so perpetuate the compartmentalization of the Community."*[761]

National implementation of the European rules seems to vary as well. It has been generally commented that the UK has less strict application of vertical restrictions than the rest of Europe, with the emphasis being placed on whether there will be a sanction for such practices being placed upon undertakings with considerable market dominance that is used in detriment to the consumer.[762] Having said this, licensors of copyleft software are not likely to posses the market share to be considered dominant by any stretch of the imagination. It is also very unlikely that these licences would be considered to impose a considerable damage to the consumer, as they always have the option to purchase non-copyleft software. Another important consideration is that copyleft licences do not fall into the four main types of vertical agreements listed by the European Commission in their Green Paper (exclusive distribution, exclusive purchasing, selective distribution and franchising).[763]

In this light, it seems unlikely that copyleft licences will be considered anti-competitive by the courts and regulators, but this is an area that demands closer scrutiny from future users of the GPL and regulators.

More generally, this initial look at the problem of the validity of copyleft licences seems to indicate that these licences are valid in accordance to general European contractual principles.

5. A drafter's primer

The problems with the validity of the GPL should serve as a warning to all of those who are willing to implement non-proprietary licences based on the copyleft ideology. Furthermore, the legal battle of SCO against IBM should also serve as a warning that the commercial interests at stake may drive proprietary developers and creators to challenge open access licences in court. One could envisage similar legal battles ensuing in areas such as biotechnology and pharmaceuticals. One need only change the names Microsoft and SCO for Celera, Monsanto and Pfizer.

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[761] European Commission, *Green Paper on Vertical Restraints in EC Competition Policy*, COM(96) 721. http://europa.eu.int/en/record/green/gp9701/vrtocen.htm

[762] Furse, Op cit; p.105.

[763] European Commission, *Green Paper on Vertical Restraints in EC Competition Policy*, op cit.

Drafters of open access licences should then be careful about the rights awarded, the type of intellectual property protected, the jurisdiction where the licences are more likely to be enforced upon, and the validity of the clauses involved. Creators and researchers in developing countries should be doubly careful about the blind adoption of licences that may prove to be invalid in their respective legal systems. This section explores some of the drafting decisions that authors, inventors and researchers should keep in mind, both in developed as in developing countries.

5.1 Standardisation vs. customisation

The first choice presented to authors or researchers that wants to distribute their work through an open licence should be whether to choose an existing standard licence, to adapt an existing one, or to draft and entirely new one. This choice is of uttermost importance, as the licence chosen will determine the level of protection awarded, the development philosophy, and it may even play a considerable part about the future adoption of a work by other developers. For example, Strasser points out that free software developers are remarkably reluctant to "pollute" their distributions with software that they do not consider to be free.[764]

The problem with choice is the amount of ideological baggage that comes with each licence, as evidenced by the differences in definitions that have been discussed throughout this and last chapter. There are indeed some similarities in principles and ideals, but these tend to be lost amongst the extensive variety of licences available. Talking in particular about the diverse nature of software licences, Gomulkiewicz points out:

> *There are four fundamental rights that an open source license needs to grant: First, access to source code; second, the right to run the software for any purpose; third, the right to change the software in any way; fourth, the right to redistribute the original software and any derivatives. However, these fundamental principles are where the consensus begins and ends.*[765]

Faced with a substantial array of licences and models from which to choose, creators may want to forego the allure of customisation and select an existing licence, possibly using the most visible and widely used one. Under this option, creative authors would choose one of the existing Creative Commons licences; software developers would choose the GPL, and science researchers would choose one of the Science Commons licences (when they are finally drafted). This option has the advantage that it allows the use of tried and tested licences that may have a

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[764] Strasser, M. "A New Paradigm in Intellectual Property Law?: The Case Against Open Sources", *Stanford Technology Law Review*, 2001, p.4.

[765] Gomulkiewicz, op cit; p.75

considerable better chance of standing up in court if challenged. On the other hand, the use of a single distribution model may generate a monoculture that would be vulnerable if the licence is defeated in court after a challenge. One only needs to imagine what would happen to the free software movement if the GPL receives a negative review in court as a result of the SCO case. The standardisation of licences also has the problem that existing licences may not fully accommodate the requirements of a specific area of research, or they may not serve the purposes of the individual author or organisation. This could result in important rights being overlooked for the sake of the ease of use.

The way to overcome the potential problems of standardisation is through minor customisation of existing licences to accommodate specific needs. This can be achieved by picking and choosing clauses and licences found in different projects and incorporate them into a modified end-product. Customisation has proved successful in the software development arena, particularly in the open source movement. Customisation is achieved by an organisation that drafts a set of principles and definitions that must be adhered to by licences in one area of study – such as is the case with the Open Source Definition. The licences that adhere to these principles are provided with a certification. This approach is also seen in open access efforts, with the Berlin Declaration and the BOAI both providing minimal standard definitions.

However, minor customisation displays a number of problems. The main complication is lack of knowledge and misunderstanding, as the person adapting the licence should truly understand the different rights and options involved.[766] Ideally this should be performed by legal professionals, but this may not be possible all the time because of lack of resources, particularly in small projects. This could be solved through the use of the internet in order to exploit the knowledge of the open access community and gain from the experience of other developers in the same area – internet weblogs[767] and mailing lists are especially useful to achieve this objective.

Another problem with customisation is that it generates licences that may not be compatible with one another. This would generally pose no problem; after all proprietary software companies release their software using their own licences all the time. However, open licences are different, particularly ones that have a copyleft or a share-alike clause. Copyleft clauses

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[766] In a recent study, Matwyshyn exposes the extent of the misunderstanding and lack of knowledge amongst software developers when choosing licences. Matwyshyn, A. *Constructing Cultural Tools of Development: Open Source Licensing, Legal Complexity and Contributor Self-Realization*; unpublished draft article, obtained from the author, 2004.

[767] An internet weblog (or blog) is an internet site with posts in chronological order that cover diverse topics.

require that the licences are compatible, or even that the same licence is used. There is a clear danger that some areas of intellectual endeavour could become incestuous or ghettoised licence environments because derivative works and adaptations would be forced to use similar licences to the works that originated them.

Despite all of the problems enumerated, a middle ground between standardisation and customisation is possible through the use of online technology. Radin explains that "... *customization of terms and conditions is possible. Instead of a take-it-or-leave-it set of fine print terms, a website could offer a menu of choices for various clauses, and the user could check boxes for which ones were desired*."[768]

There is a rarer and bolder approach. One can forego standards and modifications and create a fully new licence. This is riskier because breaking new ground is not easy, but this is precisely how new ideas take place. The GPL is perhaps the best example of this approach. However, this should be the last resort, and should only be undertaken by people who are extremely capable in their fields of endeavour, and that have a basic understanding of licences.

5.2 International vs. national

The second choice for creators and researchers in the open access movement is closely related to the standardisation dichotomy. There cannot be any doubt that the open access phenomenon is now a global one, therefore developers should think carefully about choosing licences that are written with American copyright law in mind.

A large portion of the most widely used non-proprietary licences are generally designed for the American legal system, such as CC licences and the GPL. This could eventually pose problems for their applicability and validity in other jurisdictions, as the analysis of the GPL in the previous section has underlined. The possible areas of conflict between licences are too many to mention, and they are obviously unique to each jurisdiction. Some possible conflicts between copyleft clauses and European contract and competition law have also been explored, but other areas remain.

One of the main areas of conflict is with regards to the consumer laws, which are areas that tend to provide marked differences between jurisdictions depending on the balance of interests protected. Some jurisdictions prefer legalistic and bureaucratic approach to consumer laws, while others tend to provide significant protection to consumers. An example can be found in

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[768] Radin, M.J. "Online Standardization and the Integration of Text and Machine", *Fordham Law Review*, Vol.70, 2002, p.1135.

UK and European law, where consumer protection regulations require that licences should be written in "*plain intelligible language*"[769] This could spell trouble for clunky and verbose licences filled with complicated legal terms, in particular licences like the GPL.

The other main area of concern for those choosing to use generic licences is the issue of moral rights, as evidenced by the argument presented in previous sections. The wide divergence in the application of moral rights between civil and common law legal systems presents the main stumbling block to the application of generic open access licences, particularly those that have been drafted in the United States. Licences such as the GPL and the CC licences tend to include only attribution rights, but ignore completely the integrity moral rights. This could prove to be dangerous in jurisdictions where the integrity right is applied more forcefully than in the UK and the US, such as Germany and France.[770] Countries with strong moral rights traditions will probably have to draft their own licences instead of having to use the American generic ones. This is already taking place, for example, a group of French legal experts have drafted their own version of the GPL with special concern to moral rights clauses.[771]

The careful implementation of the open access licences model with adjustments for each country involved constitutes a serious option for creators. There are already adapted versions of the Creative Commons licences for Brazil, Finland, Germany, Japan and the Netherlands, with many other countries drafting their own adaptations under the auspices of the CC organisation.[772] However, this may result in some unwanted fragmentation of licences, returning us to the standardisation debate. Talking about the iCommons UK licence implementation, internet activist Cory Doctorow points out that:

> *"Creators will have to decide if they want to grant the UK freedoms or the US freedoms -- which means that a creator in the US might choose a UK license or vice-versa: we're trying to simplify the licensing process, not complexify it, and 100 different national implementations of the CC license invites a combinatorial explosion of license confusion."*[773]

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[769] UTTCR, s. 6(1).

[770] For an excellent look at moral rights and OSS in Germany, see: Metzger, A. and Jaeger, T. "Open Source Software and German Copyright Law", *IIC* Vol. 32, 2001, pp.52-74.

[771] An example of this is a French adaptation of the GPL. See: http://www.inria.fr/valorisation/logiciels/Licence.CeCILL-V1.US.pdf

[772] See: http://creativecommons.org/projects/international/

[773] Doctorow, C. "New CC-UK license draft", *Cc-uk mailing list*, July 13, 2004. http://lists.ibiblio.org/pipermail/cc-uk/2004-July/000035.html

Another argument against the internationalisation of existing licences is the fact that many companies already produce intellectual products in one country and distribute them internationally with the same licence that they applied in the jurisdiction of origin – a typical example is Microsoft. While this objection is factually accurate, it must be remembered that proprietary licences are designed to operate in an entirely different distribution model. Proprietary licences are generally quite simple; they protect the software and grant some limited rights to the user.[774] On the other hand, the open access licensing model generally involves very complex legal relationships, as evidenced by the validity analysis described above. Many concepts are new and have not been tested in court – such as copyleft clauses – and getting the licence right is vital. It is also important to think about locality, because open access generally involves individual creators and developers who do not have the resources to enforce their work around the world. Large proprietary companies have access to a network of local firms around the world, and the resources to use them. They have the power, and the money to implement their licences.

Internationalisation is very important for developing countries, as open licences should be able to withstand scrutiny in each jurisdiction because it is likely that some may be challenged by proprietary companies. This would require legal experts in each country to draft new licences, or to ascertain the validity of existing ones in each jurisdiction.

5.3 Specific clauses

All of the points mentioned in the last two sub-sections should be considered while choosing whether to adapt an existing licence or using a standard form. However, if the decision is to customise, then drafters should be aware of the existing perils of each of the clauses that are generally used in the non-proprietary system. New licence drafters have to look for licence options that follow the open access ethos described model, but they must be able to adapt the common clauses to fit their specific needs. The following clauses should be taken into consideration by the drafters of these licences:

a) Back to basics. The licence must be always clear about what intellectual property rights are protected; what is its subject matter; who owns the rights, what development model is sought; what philosophy fits that development; and what will be the likely opposition to the licence.

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[774] For example, see a typical Microsoft end user agreement: http://www.microsoft.com/windows95/downloads/contents/wuadmintools/S_WUNetworkingTools/W95Sockets2/LicenseAgr.asp

Stakeholders should always ask these questions before undertaking any licensing exercise, and they should also look at existing standard licences for inspiration.

b) Moral rights. While moral rights are generally more prevalent in civil law systems, special care should be taken in order to ensure that the proposed clauses comply with their application.[775] The licence should consider whether to assume their existence, or to make it an essential part of the licence. For example, some jurisdictions require moral right clauses to be specified or asserted in the licence, while others assume their existence.

c) What rights are being granted? Copyright law gives authors a wide variety of rights, which may vary from one country to another. For example, UK copyright law gives authors the right to copy, distribute, adapt, perform, and broadcast works, amongst others.[776] Careful thought should go towards thinking which rights should be granted and that these rights are in accordance with local copyright law. Some specific regimes may apply to derivative works, adaptations and translations.

d) Commerciality. Some licences object to the distribution and creation of derivative works based on the original work if it is going to be used or distributed for commercial purposes. If a similar clause is going to be included in the licence, then there should be a strict definition of what is meant by commercial. A useful distinction may be made between proprietary and commercial use.

e) Spreading the licence by viral means. Copyleft licences contain a viral clause that specifies that derivative works should use the same licence as the original. This is a very difficult legal subject; as such clauses may prove to be unconscionable in some jurisdictions. Furthermore, some of these licences may run contrary to traditional contract law, as it may be difficult for the original author to try to enforce the licence further down a chain of derivative works. Drafters of new licences should keep in mind that viral clauses may be objected to in their local jurisdictions.

f) Support and liability. Drafters should pay some thought to the possible liabilities arising from the work. Most American open licences contain disclaimers of liability and admonitions that the work that is licensed is not supported and is not offered under warranty. There is a

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[775] For more on moral rights, see: Hansmann, H. and Santilli, M. "Authors' and Artists' Moral Rights: A Comparative Legal and Economic Analysis", *Journal of Legal Studies*, Volume 26, Issue 1, 1997, pp.95-143.

[776] CDPA, s16(1).

growing trend in consumer and contract law to consider broad exclusion clauses as unconscionable.[777]

g) Other IPRs? As discussed earlier, open licensing models may not translate well into other intellectual property regimes, particularly software. Although most non-proprietary licences in existence are designed with copyright in mind, some thought should go towards creating licences in intellectual works protected by other types of intellectual property, such as patents. This may prove difficult given the vast difference in registration and enforcement between both systems, but if works are already protected and registered, then specific non-proprietary will have to be drafted. .

These are just some initial considerations for future licence drafters around the world. However, a final recommendation should be directed to potential licensors in developing countries – and to those interested in allowing the transfer of open technology to poor nations. There is dire need of more projects that tackle the transfer of technology in the natural sciences, as most open access and open content projects are presently geared towards the distribution of cultural works and educational works, and not towards the distribution of technological resources. Although the conservation of cultural content is a worthy cause, it is not what is needed at present in developing countries. The absence of a patent-specific licence demonstrates this problem, as the amount of useful technologies protected by copyright is limited. These criticisms may appear harsh when the educational uses of open technology are obvious; but more work is required to ensure adequate technology transfer open licences.

[777] For more on this subject, see: Lawson, op cit.

Conclusion

> *"If you want to know your past, look into your present conditions. If you want to know your future, look into your present actions."*
> ***Buddhist saying***

The problem of the transfer of technology to developing countries is essentially a topic that deals with innovation, imitation and trade. Technology is being created all the time, but true innovative leaps are few and far between. Most innovation results from the reshaping and improvement of existing technology, which makes technological endeavour a matter of access to existing innovations. One of the results of the nature and characteristics of technological development is that access restrictions to the initial innovative technology will lead to fewer future advances. Another corollary from the cumulative nature of technological advancement is that technologies become more complex as time goes by, and therefore the amount of research and development required to produce innovations becomes higher as well.

As innovation becomes more expensive, there is more of an incentive to copy and imitate technology that has already been developed by those with the resources to achieve it. This imitation could take three different shapes: it could be purchased directly from the owner of the technology; it could be adopted once it has become non-proprietary; or it could be subject to reverse-engineering and used without the owner's permission.

Developing countries find themselves in different stages of this imitation trilemma. At the present time, most valuable proprietary technology must be acquired from the owners through licences. The second option is to wait for the technology to lose its intellectual property protection, which may prove to be a good option for low-technologies. However, most of the higher technology sought by developing countries may be required immediately in order to accelerate the development process. Therefore, waiting for it to become available is often not a viable alternative.

Some nations have reached a stage of development that allows them to imitate technologies from developed nations – for example, Brazil and India can imitate pharmaceutical technology at present with a large level of success. As a response to the growing imitative capabilities of some developing countries, industrialised nations have been pushing for a stronger international intellectual property regime; a trend that attempts to ensure that technology is acquired through some form of monetary purchase in the shape of licensing agreements. This is achieved through the enactment of trade agreements that regulate the transfer of knowledge, such as TRIPS.

Under present circumstances, the transfer of technology becomes an issue of international trade, in which there is a flow of advanced technology to those developing nations that can afford it. At the same time, the knowledge possessed by developing nations is held in low esteem, or is not subject to intellectual property protection and therefore holds little bargaining value within these international relations.

There may be some possible solutions to the technology trading deficit. One solution is a top-down approach in which governments negotiate new international agreements – or amend existing ones – that provide a framework for ensuring the transfer of technology to developing countries, or even give them leeway to imitate proprietary knowledge. This is already taking place in the area of access to essential medicines with efforts by the WTO to ensure some flexibility in the application of trade restrictions for pharmaceuticals. However, more should be done in this respect because technology transfer provisions in existing agreements and treaties have proven to be insufficient to encourage increased flow of information. Ideally, the top-down approach should be followed by capacity-building within developing countries. This can be encouraged through education and the use of ICTs to acquire the knowledge that will translate into indigenous innovation. This is a long-term solution because education is an investment in the future.

A more likely approach is to encourage the creation of a common pool of knowledge where people from around the world can share ideas and technology. The creation of a common space will have the benefit that the flows of technology that have been the source of so many problems would eventually become irrelevant. With the creation of open access to information, technology that has been conceived in Germany can be copied and implemented in Haiti; and knowledge originating from Brazil can be used in Japan.

The easiest way in which this common space can be created is by releasing the information into the public domain and relinquishing all ownership claims to it. This approach is already taking place, especially in biotechnology research. However, the release of information into the public domain can have some negative effects. There is a chance that this information will eventually be appropriated by proprietary interests and then “closed”, commodified, and commercialised. This would mean that further access to the information could become compromised. To avoid this, the common space requires some form of protection against abuse and misuse.

The experience of open source or free software technologies has offered a legal mechanism to control the access to the common space. Open licences could serve as a legal deterrent to those

who would like to take that information, repackage it and make it proprietary. If we think of intellectual property as a fence, the non-proprietary model would work best by placing the fence around the information, yet leaving the gate open. The licence could be understood as the gatekeeper. If somebody tries to get that information with a view to shutting the gate behind them, the gate-keeper could shut the gate first and deny access. In other words, the licence would prevent such rustling. The open licence model has several advantages over the top-down approach. It is cheap to implement, it does not require lobbying of officials and legislators to obtain some small concessions. Most importantly, open licensing can be adopted immediately.

There should still be caution with the implementation of the open licensing philosophy. Firstly, the development model exemplified by the open source software movement has only proven to be successful in the area of computer programming; and it may not be easy to port into scientific research. Secondly, there is a significant risk of a backlash from commercial and proprietary developers, which could be translated into lengthy and expensive legal suits. Thirdly, there is a lack of licences at present to protect scientific research using the open access philosophy, which could result in the creation of a copyright-only common space.

A final warning should be that one could argue that the open model encourages the distribution of low-quality intellectual works, while all the quality materials are offered commercially. This would mean that the common space would consist only of defective software, badly written poetry, niche market music and holiday photos. The efforts of the open access journal movement could help to avoid this scenario. Peer-review will still be necessary in the common space.

Non-proprietary models and open access are still the way of the future for many developing countries. They can help to alleviate immediate problems, such as the digital divide and access to affordable and stable software solutions for education. But the potential benefits have not been met yet. Open content, open biotechnologies and open medicines are yet to prove their promise. The time to implement these ideas fully has finally arrived.

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